Schroff®

AdvancedTCA®

14-slot NextGen ATCA Shelf

User Manual

Product Number:

11990-100/101/102/103

Doc-No: 63972-310_R1.2_

July 2013

Pentair
Technical Products

D1.0	September 2011	Draft Release
R1.0	June 2012	Initial Release
R1.1	September 2012	PMBus removed, Air flow tables added
R1.2	Juliy 2013	System 11990-102/103 with Dual/Dual Star BP added, Specifications and informations for the ground and power cables updated

Impressum:

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The details in this manual have been carefully compiled and checked - supported by certified Quality Management System to EN ISO 9001/2000

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1 Safety

The intended audience of this User's Manual is system integrators and hardware/software engineers.

1.1 Safety Symbols used in this document

	Hazardous voltage! *This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.*

	Caution! *This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.*

	Danger of electrostatic discharge! *The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.*

1.2 General Safety Precautions

	Warning! *Voltages over 60 VDC can be present in this equipment. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.*

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment.
- Install this equipment only in compliance with local and national electrical codes.
- For additional information about this equipment, see the PICMG 3.0 Specification (*www.picmg.com*).

1.3 References and Architecture Specifications

- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (*www.pigeonpoint.com*)
- PICMG® 3.0 R3.0 AdvancedTCA® Base Specification (*www.picmg.com*)
- Schroff Shelf Manager User‘s Manual, Order-no. 63972-243

The documentation is available for registered users at www.schroff.biz

1.4 Product definition

The Schroff 11990-10x is a 14 U / 14 Slot ATCA 40G Shelf with enhanced per-slot power and cooling capability along with 40G backplane connectivity.

- Product Number 11990-100: 14 U Dual Star Backplane, bused IPMB
- Product Number 11990-101: 14 U Dual Star Backplane, radial IPMB (not for on-blade shelf management)
- Product Number 11990-102: 14 U Dual/Dual Star Backplane, bused IPMB
- Product Number 11990-103: 14 U Dual/Dual Star Backplane, radial IPMB (not for on-blade shelf management)

The Schroff 11990-10x is designed to work with two redundant Schroff ShMM-ACB-V Shelf Managers. At least one Shelf Manager is needed for a working System.

On-blade Shelf Management for systems with bussed IPMB available on request.

Shelf Manager with bused IPMB: 21596-291 (Product Number)
21596-300 (Catalog Number with packaging)

Shelf Manager with radial IPMB: 21596-292 (Product Number)
21596-301 (Catalog Number with packaging)

The Shelf Managers are not included with the Shelf

1.5 Terms and Acronyms

Table 1: Terms and Acronyms

Term	Definition
ATCA	Advanced Telecom Computing Architecture
Backplane	Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported
CDM	Chassis Data Module
Chassis	Enclosure containing subrack, Backplane, boards, cooling devices, PEMs, same as Shelf
CMM	Chassis Management Module, same as Shelf Manager
ECN	Engineering Change Notice
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FRU	Field Replaceable Unit
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
PCB	Printed Circuit Board
PEM	Power Entry Module
RTC	Real Time Clock
RTM	Rear Transition Module
Shelf	See Chassis
VRTN	Voltage Return

2 Hardware Platform

- Mounting brackets for 19“ cabinets
- ESD Wrist Strap Terminals at the front and the rear
- 14 slot ATCA 40G Backplane with Dual Star or Dual/Dual Star Fabric Interface, Dual Star Base Interface and bused or radial IPMB interface, supporting twelve 8 U node board slots and two 8 U hub slots
- 2 dedicated Shelf Manager slots accepting Schroff ShMM-ACB-V Shelf Managers
- Electrical power 450 W/slot
- Enhanced cooling capability:
  Overall airflow = 2000 m³/h (1180 CFM)
  Front slot airflow = 113 m³/h (67 CFM) at the lowest performing slot
  Rear slot airflow = 16 m³/h (9 CFM) at the lowest performing slot
  (Air flow measured with CP-TA boards)
- Push-Pull Fan Tray arrangement provides optimized cooling for ATCA blades with fault tolerant capability
- Two pluggable, hot swappable Fan Trays
- Air inlet filter including air filter presence sensor
- Telco Alarm interface, Alarm Status LEDs, Fan Tray Alarm LEDs and serial interfaces for the Shelf Managers on bottom Fan Tray
- Rear pluggable dual redundant Power Entry Modules (PEM) with enhanced electrical power capability with 210 A per PEM: Each PEM has 6 internal power branches and providing connection of one power feed.

2.1 Shelf Front and Rear View

Figure 1: Shelf Front View

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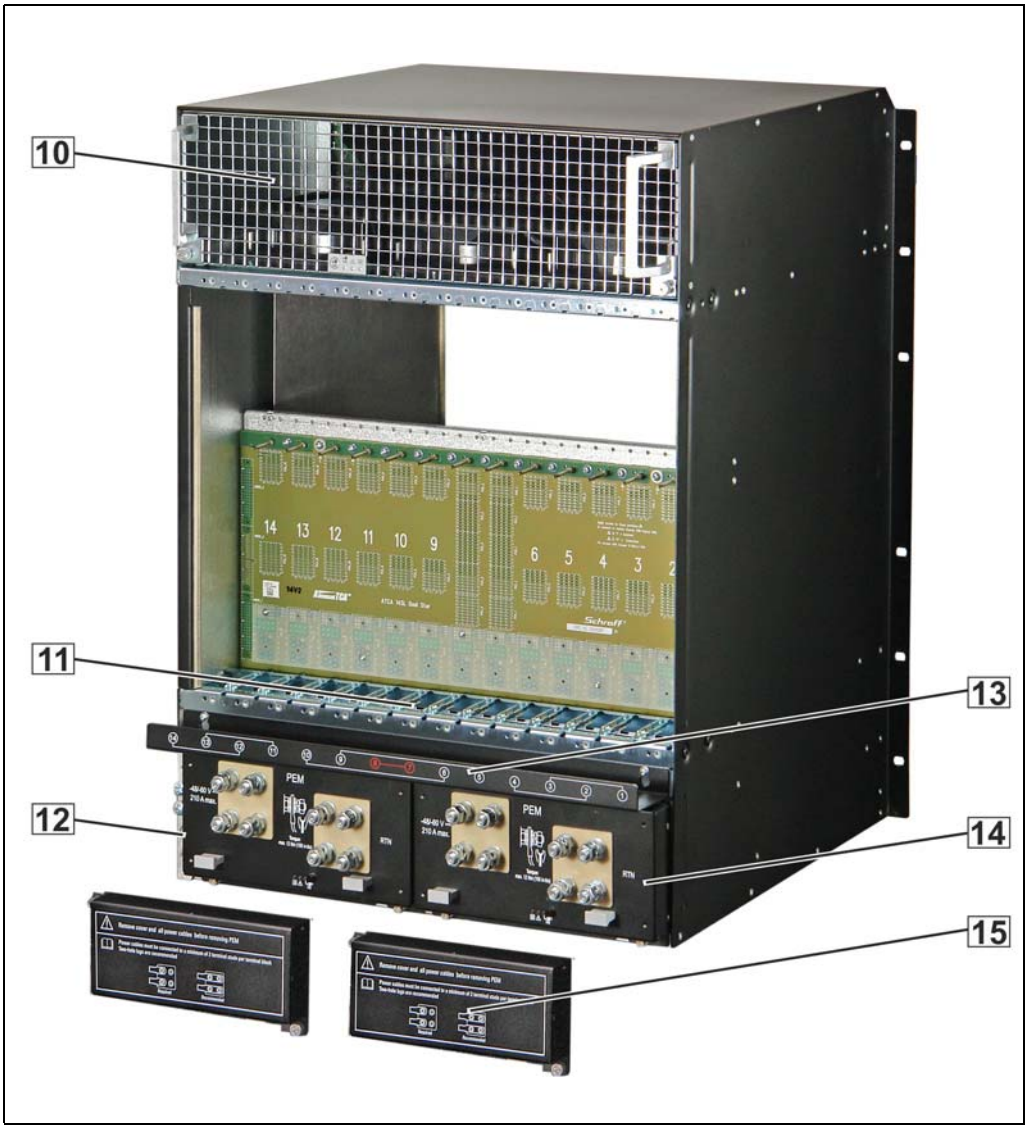
1	Front Cable Tray	6	ESD Wrist Strap Terminal
2	ATCA 14-Slot Backplane	7	Serial Interfaces for the Shelf Managers
3	Front Card Cage	8	Air Filter Tray
4	Fan Tray 1	9	Shelf Manager 2
5	Slot for Shelf Manger 1		

Figure 2: Shelf Rear View



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10	Fan Tray 2	13	Rear Cable Tray
11	Rear Card Cage	14	Power Entry Module A (PEM A)
12	Power Entry Module B (PEM B)	15	PEM Cover

2.2 ESD Wrist Strap Terminals

	Danger of electrostatic discharge! **Static electricity can harm delicate components inside the Shelf. You must wear an ESD wrist strap before exchanging any part or electric component!**

Two ESD Wrist Strap Terminals (4 mm banana jacks) are located at the upper front and lower rear side of the Shelf.

3 ATCA Backplane

The 14-slot ATCA monolithic 40G Backplane provides:

- 40 Gb/s connectivity (4 lanes with 10 Gb/s)
- 12 ATCA Node slots
- Two ATCA Hub slots
- Two dedicated Shelf Manager slots
- Two Power Entry Module (PEM) slots
- Two slots for the Chassis Data Modules (CDM)

3.1 Interfaces

3.1.1 Base Interface

Logical slots 1 and 2 are the hub slots for the Dual Star Base Interface.
Base Interface Channel 1 (ShMC) of logical slot 1 and 2 is cross connected to both dedicated Shelf Manager slots on the ATCA Backplane.

3.1.2 Fabric Interface

The Fabric Interface in the ATCA Backplane is wired as Dual Star, supporting four ports per channel.

- See PICMG® 3.0 AdvancedTCA® Base Specification for details.

3.1.3 Synchronization Clock Interface

6 differential pairs of synchronization clocks are bused between all 14 ATCA slots and terminated at both ends with 80.5 Ohms between each differential pair.

3.1.4 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots as 10 differential pairs with 100 Ohms impedance. (See Table 2 in this Chapter)

The Update Channel is intended to pass information between two redundant ATCA Boards.

The Update Channel assignment is printed on the frontside of the Shelf.

3.1.5 Power Interface

- Power distribution within the ATCA Backplane is divided into 6 Power Branches. This topology is used for safety reasons to keep the max. current per branch less the 35 A. Slots connected by update ports, are on separate power branches as well as both hub slots, the Shelf Manager slots and the Fan Trays.

3.2 Backplane Overview

Dual Star

	Node	Node	Node	Node	Node	Node	Hub Star 1	Hub Star 2	Node	Node	Node	Node	Node	Node
Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical Slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4C	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel														
Power Branch	1	1	2	2	3	3	3	4	4	4	5	5	6	6

Dual Dual Star

	Node	Node	Node	Node	Node	Hub Star 3	Hub Star 1	Hub Star 2	Hub Star 4	Node	Node	Node	Node	Node
Physical Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Logical Slot	13	11	9	7	5	3	1	2	4	6	8	10	12	14
HW-Address (Hex)	4D	4B	49	47	45	43	41	42	44	46	48	4A	4C	4E
IPMB-Address (Hex)	9A	96	92	8E	8A	86	82	84	88	8C	90	94	98	9C
Update Channel														
Power Branch	1	1	2	2	3	3	3	4	4	4	5	5	6	6

3.3 Dedicated Shelf Manager Slots

The front accessible Shelf Manager slots accept Schroff ShMM-ACB-V Shelf Managers and are wired to:

- IPMB-A and IPMB-B (I²C-bus)
- Base Interface Channel 1 (ShMC) of the Base Interface Hub slots, supporting Shelf Manager Cross Connect (10/100 Base T Ethernet)
- Fan Tray connectors
- PEM A and PEM B connector

The dedicated Shelf Manager slots also have interconnected signals that allow the Shelf Managers to run in a redundant configuration.

3.3.1 Intelligent Platform Management Interface

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards and the Shelf Managers. The reliability of the IPMB is improved by the addition of a second IPMB, with the two IPMBs referenced as IPMB-A and IPMB-B.

IPMB-A and IPMB-B are routed to the ATCA slots in:

- a bused configuration
  (Product Number: 11990-100/102)
- a radial configuration
  (Product Number: 11990-101/103)

Figure 3: Bused IPMB

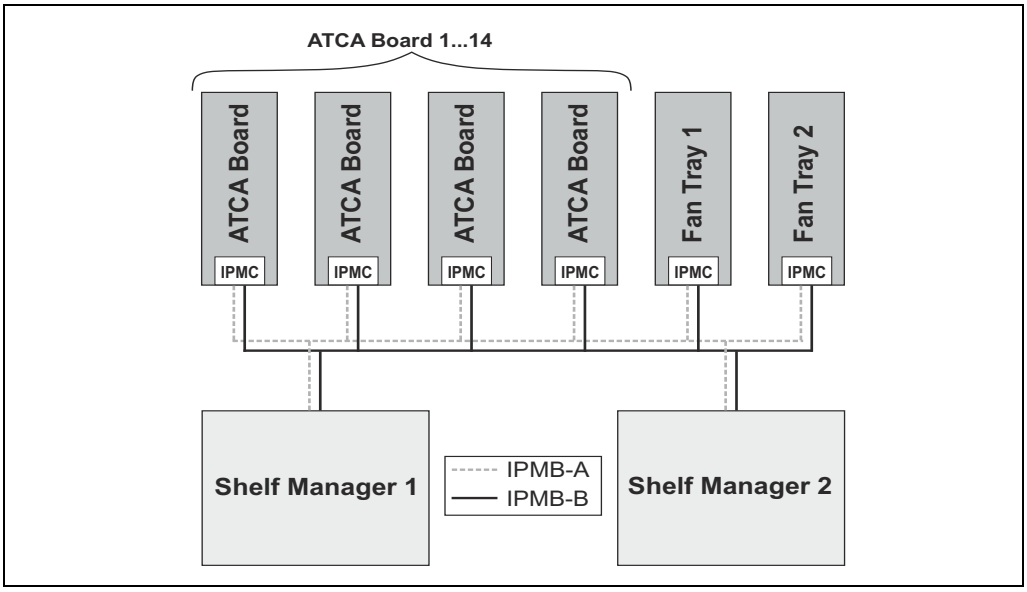

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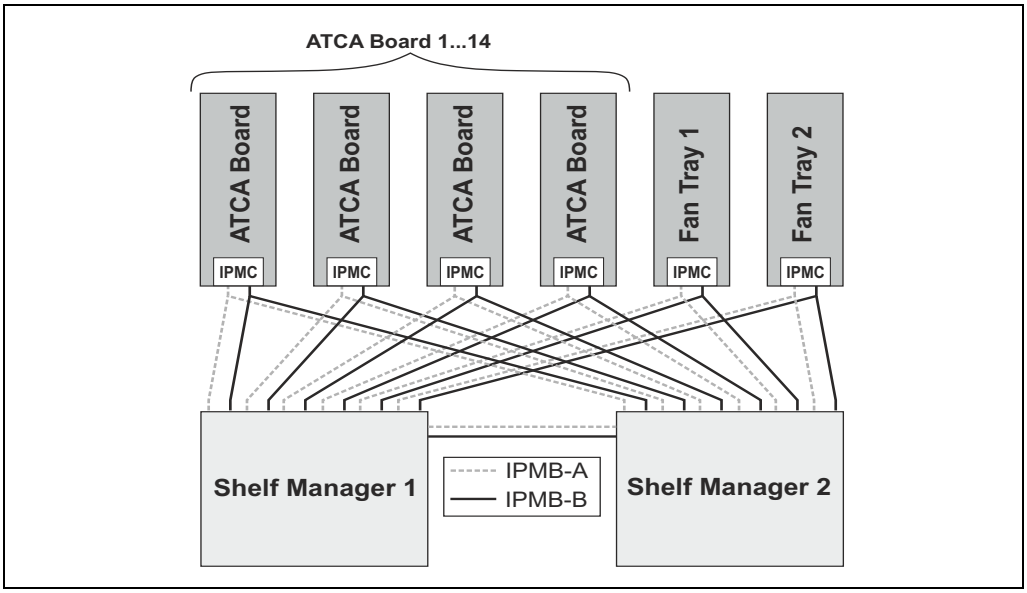
Figure 4: Radial IPMB



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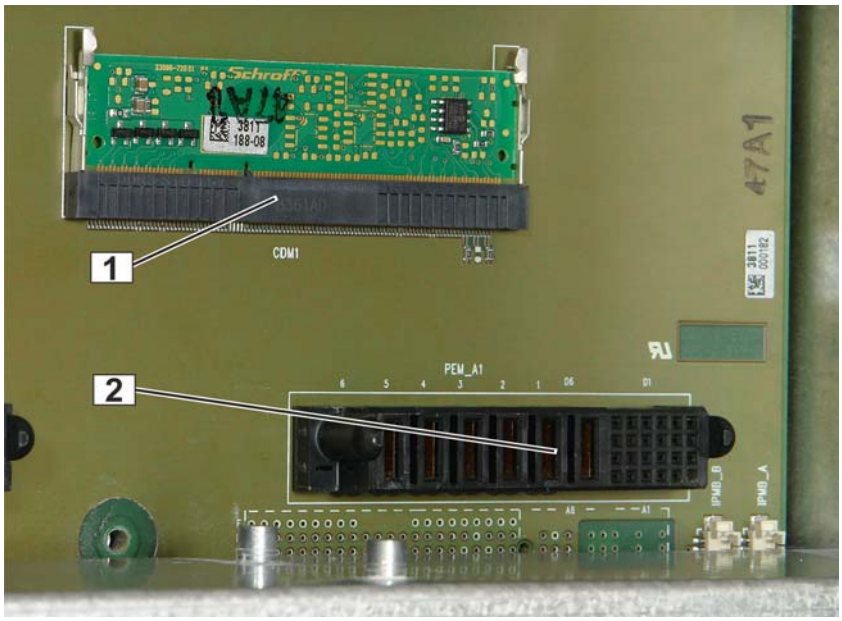
3.4 Chassis Data Modules (CDM)

The Chassis Data Module (CDM) is a carrier board for the FRU SEEPROM (24LC256)

Figure 5: Chassis Data Module 1 (CDM 1)



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1 CDM 1 2 Connector PEM A

Both CDMs are pluggable modules and located on the rear side of the ATCA Backplane. The modules can be accessed after removing the respective Power Entry Module (PEM).

Warning!

Before removing a PEM, make sure that all Power Feeds of the other PEM are fully functional.

Table 2: Chassis Data Module I²C addresses

CDM	Channel	I²C-bus address
CDM 1, SEEPROM	Channel 1	0xa4 / 52
CDM 2, SEEPROM	Channel 2	0xa4 / 52

3.4.1 IPMB-A Connector (Assembly Option)

Connector IPMB-A is wired to the IPMB-A bus and is not assembled by default.

Table 3: IPMB-A Connector

Pin#	Signal name	Description
1	SCL_A13	IPMB-A, Serial clock
2	GND	Logic Ground
3	SDA_A13	IPMB-A, Serial Data
4	I2C_PWR_A	3,3 VDC power supply for Shelf I²C-bus devices

3.4.2 IPMB-B Connector (Assembly Option)

Connector IPMB-B is wired to the IPMB-B bus and is not assembled by default.

Table 4: IPMB-B Connector

Pin#	Signal name	Description
1	SCL_B13	IPMB-B, Serial clock
2	GND	Logic Ground
3	SDA_B13	IPMB-B, Serial Data
4	I2C_PWR_B	3,3 VDC power supply for Shelf I²C-bus devices

3.5 Shelf Manager Cross Connect

The ATCA Backplane provides cross connect traces between the Base Hubs and the Shelf Managers according to PICMG Engineering Change Notice ECN 3.0-2.0-001. This ECN adds an option for dual 10/100 Base-T links from each Base Hub to both dedicated Shelf Manager slots.

Figure 6: Shelf Manager Cross Connect

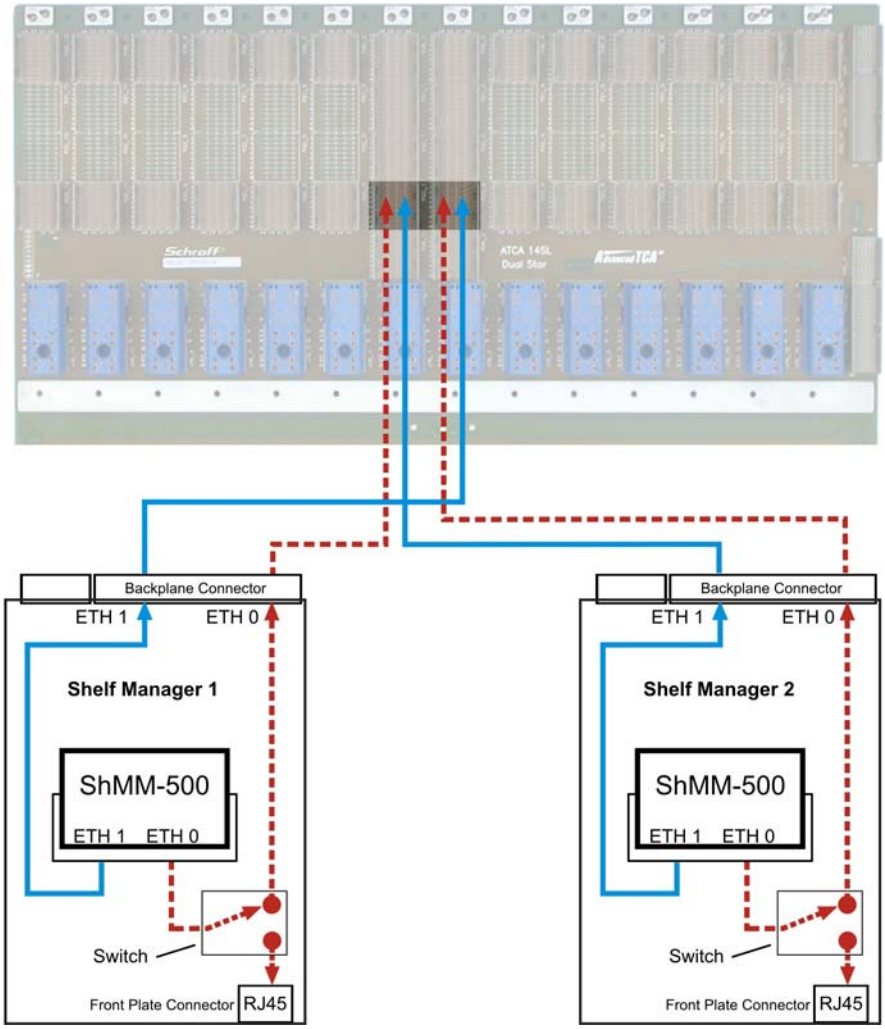

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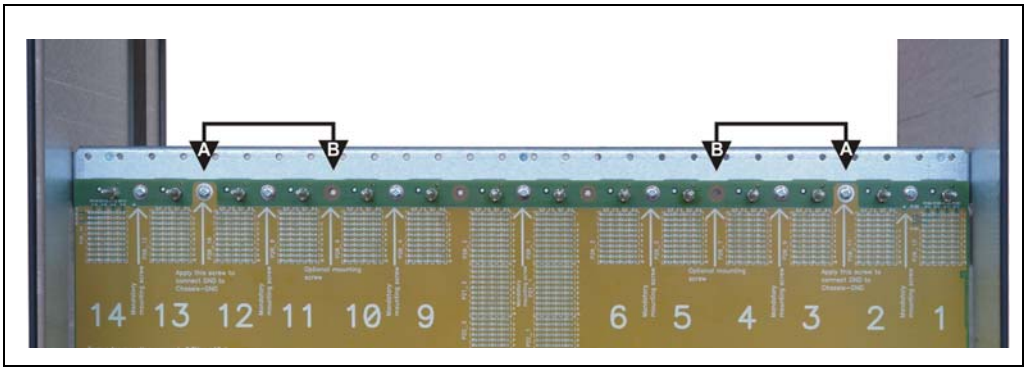
Table 5: Connector (P23) pin assignments for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

3.6 Logic Ground (GND) and Shelf Ground (Shelf_GND)

Figure 7: Logic Ground/Shelf Ground Connection



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The ATCA Backplane provides a mechanism to connect Logic Ground (GND) and Shelf Ground (Shelf_GND). You can connect/isolate Logic Ground by swapping two screws from position (A) to position (B).

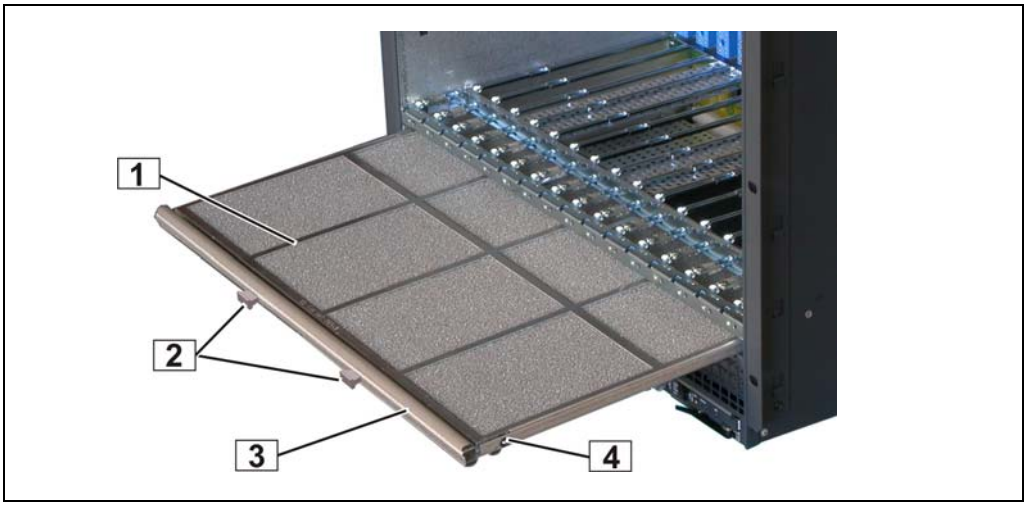
- Screws at position (A): Logic Ground and Shelf Ground connected.
- Screws at position (B): Logic Ground and Shelf Ground isolated.

Torque for the Screws: 0.7 Nm +10%

Logic Ground and Shelf Ground is not connected by default.

4 Air Filter

Figure 8: Air Filter



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1	Filter Element	3	Filter Tray
2	Handles	4	Spring mounted ball lock

4.1 Introduction

The ATCA Shelf provides a front replaceable air filter.

The filter meets the requirements of the Telcordia Technologies Generic Requirements GR-78-CORE specification.

4.2 Air Filter Replacement

The air filter tray can be removed by pulling the air filter's handle. To re-install, push the air filter tray into the guide rails at each side of the shelf until the spring mounted ball lock engage.

When installing the air filter, the filter element must be in top position

4.3 Air Filter Presence Sensor

The air filter presence is detected by a reed contact located on the backplane. The reed contact is activated by a magnet mounted at the rear side of the air filter metal frame.

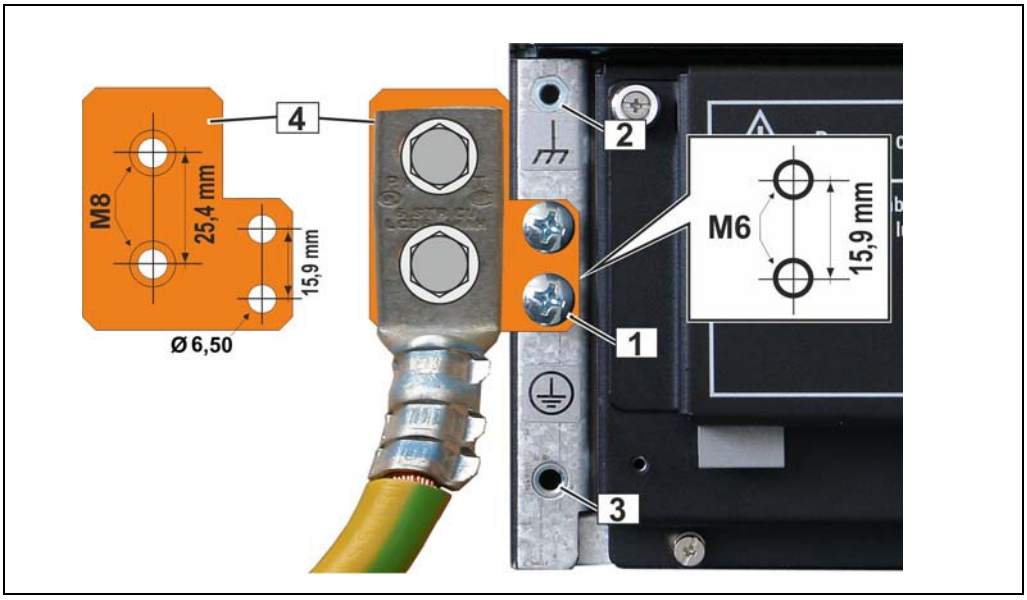
5 Shelf Ground Connection

	Hazardous voltage! *Before powering-up the Shelf, make sure that the Shelf Ground terminal is connected to Protective Earth (PE) of the building.*

Please note, that in a typical telecom environment, the VRTN path of the -48 V supply is grounded to Protective Earth (PE) of the building.

The shelf ground cable can be connected at the left rear bottom side. To connect an adequate two hole lug for the 250 kcmil ground cable, the shelf comes with an adapter plate.

Figure 9: Shelf ground terminal



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1	Shelf Ground Terminal	3	Additional fixing point (M6)
2	ESD Terminal	4	Adapter plate

5.1 Specification for the Shelf Ground connection cable

Required wire size: 250 kcmil, maximum length = 3 m.

Required lugs: Use only two-hole lugs.
(For example PANDUIT LCC250-38DH-X or LCD250-38DH-X)

6 Fan Trays

6.1 Introduction

The Fan Trays are intelligent FRUs controlled by the ShMCs via IPMB.

The ATCA Shelf contains two interchangeable Fan Trays arranged in a push-pull configuration for maximum air flow. The Fan Trays are plugged-in below and on top of the card cage.

Each Fan Tray contains six high speed / high air flow fans controlled as a group by the IPM Controller in the Fan Tray.

The Fan Tray is locked into the Shelf with two captive screws. A hot-swap push button is used to provide hot-swap functionality.

The lower Fan Tray provides the Telco Alarm interface and the serial interfaces for the ShMCs.

Each Fan Tray provides:

- A blue Hot Swap LED
- A red Fan Tray Alarm LED
- A green Fan Tray OK LED
- A Hot Swap push button

The Fan Tray is controlled via an on-board IPM controller. The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

When the Fan Tray is first inserted into the system, the fans start at full speed and then decrease to 25% of full speed. The circuitry on-board the Fan Tray uses a PWM signal to control the speed of all the fans. Lower speeds reduce acoustic noise and power consumption and increase the lifetime of the fans.

The speed of each individual fan is monitored. If any of the fan speeds drops below the desired fan speed, a System Event Log (SEL) entry is logged by the Shelf Manager. The Shelf Manager then generates alerts and sets alarm conditions as necessary.

The system is designed to run indefinitely with any single fan failure. When one fan fails, all other fans are not increased to full speed. The Fan Tray has sufficient cooling capacity to keep the Shelf cooled with a single fan failure. If two fans in the system fail (one fan in each fan tray or two fans in one fan tray), the remaining fans are set to full speed.

Figure 10: Upper Fan Tray

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Figure 11: Lower Fan Tray

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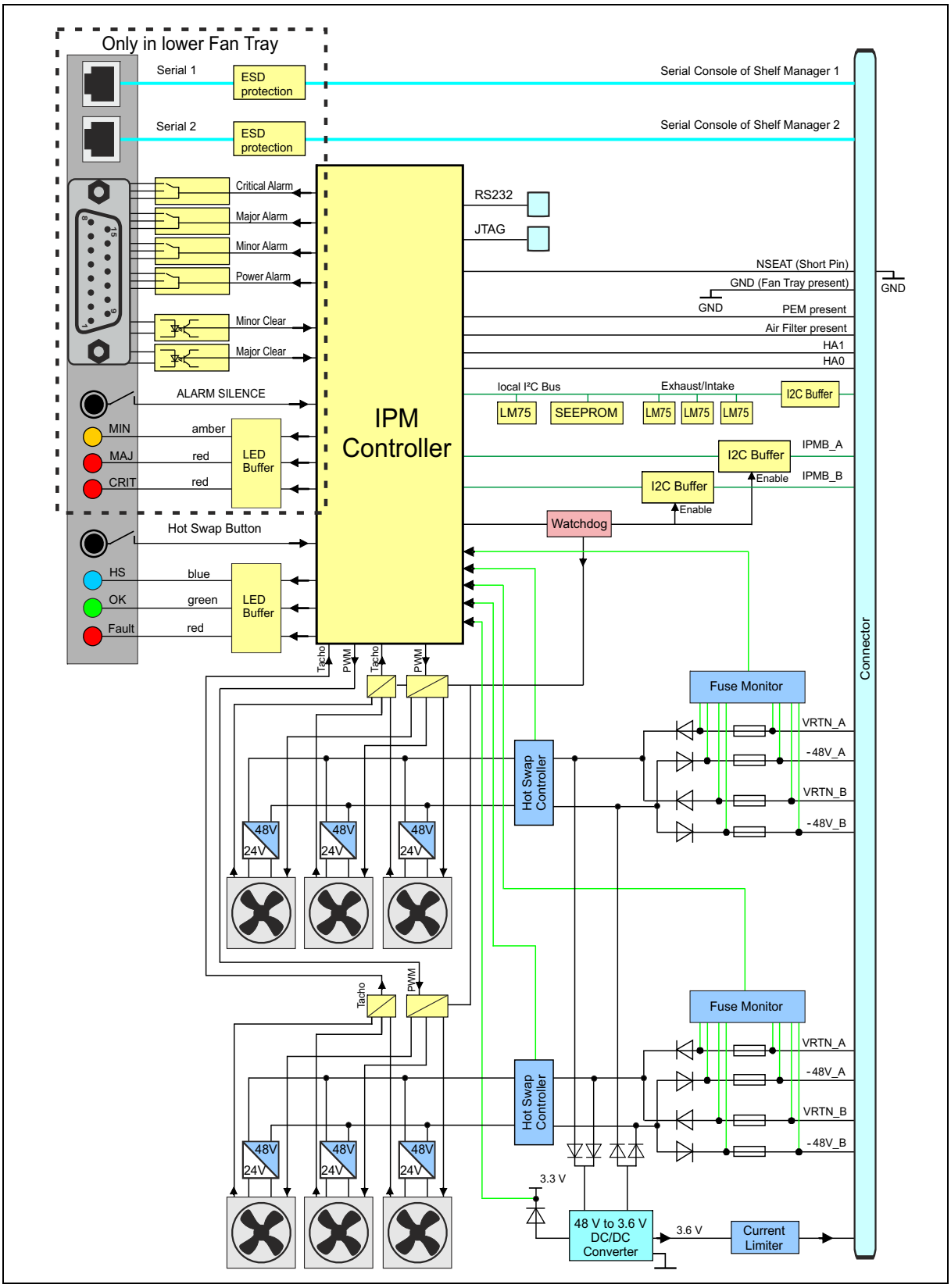
6.2 Maintenance/Service

We recommend a fan tray replacement every 4,5 years.

6.3 Fan Tray Block Diagram

Figure 12: Fan Tray Block Diagram



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6.4 Fan Tray Signals

The Fan Tray provides signals for:

- Voltage monitoring
- Status of the Hot Swap Controller
- Fan Speed
- Temperature

These signals are controlled by the IPM Controller devices on the Fan Tray PCB. The Shelf Manager has access to these signals via IPMB.

6.5 Fan Tray Temperature Sensor

The temperature sensors (LM75) in the Fan Trays measure the input and exhaust temperatures of the Shelf.

6.6 Fan Tray Connectors and Indicators

The front panel includes a green and red Status LED and a blue hot-swap LED.

The Hot-Swap push button indicates to the Shelf Managers that the Fan Tray is about to be removed. Its use is optional, but it is provided so that service personnel can be trained to look for a blue LED to be illuminated on any active component before removing it from the system. Once the operator pushes the Hot-Swap button, the Shelf Manager is informed of the pending extraction. When the Shelf Manager feels it is “safe“ to remove the Fan Tray, the blue Hot-Swap LED illuminates solid.

Table 6: LEDs on Fan Tray front panel

Color	Description	Status	Condition
Green/Red	Status LED	Off	No Power to the Fan Tray
		Solid green	Normal Operation
		Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	No Power to the Fan Tray or not OK to extract Fan Tray
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

6.7 Telco Alarms

6.7.1 Telco Alarm Interface

The lower Fan Tray provides a Telco Alarm interface on the DB15-male connector. Three relay outputs are used for remote alarm distribution, reflecting the state of the three Alarm LEDs. The relays are capable of carrying 72 VDC or 1 A with a max. rating of 30 VA.

6.7.2 Telco Alarm LEDs

The lower Fan Tray provides the Telco Alarm LEDs. These LEDs indicate presence of Critical, Major and Minor alarms as follows:

Table 7: Telco Alarm LEDs

State	Description
Off	No alarm active
On	Alarm active
Flashing	Alarm active, but silenced

6.7.3 Alarm Silence Push Button

The Alarm Silence push button on the lower Fan Tray faceplate deactivates the alarm relays. During the time Alarm Silence is activated, the Alarm LEDs flash. By pressing the Alarm Silence push button a second time, the alarm relays are reactivated and the Alarm LEDs are solid.

*The **Alarm Silence** push button only activates the Alarm Silence state, but does not reset the alarms. If the silence interval (default 600 s) is exceeded without resolving the alarms, the alarms will be re-initiated.*

6.7.4 Alarm Reset

Hardware Reset:

Two relay inputs at the DB15 connector are used to reset the Minor and Major alarm state.

The reset inputs accept timed pulse inputs for clearing Minor and Major alarm states. Reset is accomplished by asserting a voltage differential from 3.3 VDC to 72 VDC for between 200 ms and 300 ms. The acceptance voltage range is from 0 to 48 VDC continuous (handles up to 60 VDC at a 50% duty cycle, 72 VDC at a 30% duty cycle). The current drawn by a reset input does not exceed 12 mA.

There is no hardware reset (reset input) for the Critical Alarm state.

Software Reset:

The RMCP and CLI functions can be used to set and reset the Telco Alarms (incl. Critical Alarm). See the Pigeon Point Shelf Manager External Interface Reference for more information.

6.7.5 Telco Alarm Connector (DB15-male)

Figure 13: Telco Alarm Connector (DB15-male)

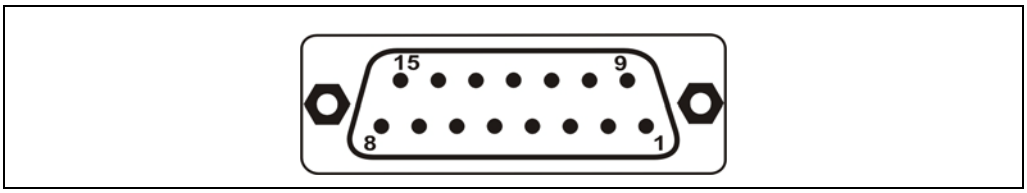

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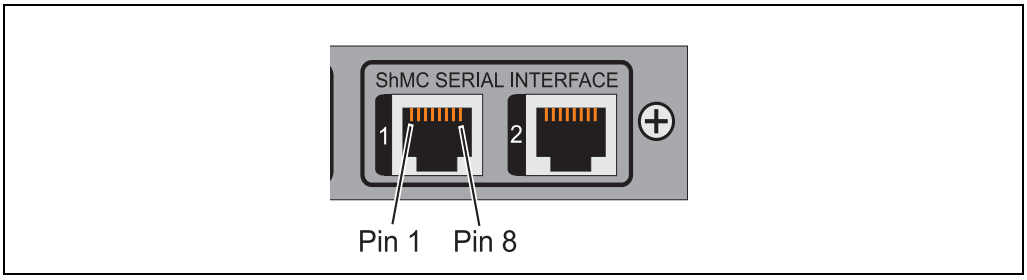
Table 8: Telco Alarm Connector Pin Assignment

Pin	Name	Description
1	AMIR+	MinorReset+
2	AMIR-	MinorReset-
3	AMAR+	MajorReset+
4	AMAR-	MajorReset-
5	ACNO	CriticalAlarm - NO
6	ACNC	CriticalAlarm - NC
7	ACCOM	CriticalAlarm - COM
8	AMINO	MinorAlarm – NO
9	AMINC	MinorAlarm – NC
10	AMINCOM	MinorAlarm – COM
11	AMANO	MajorAlarm – NO
12	AMANC	MajorAlarm – NC
13	AMACOM	MajorAlarm – COM
14	APRCO	PwrAlarm – NO
15	APRCOM	PwrAlarm - COM
Shield	Shelf-GND	Shelf Ground

6.8 RS-232 Serial Console Interfaces

Figure 14: RS-232 Serial Console Interfaces



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The lower Fan Tray provides two RS-232 serial console connectors for Shelf Manager 1 and 2. The connectors are 8-pin RJ45 modular receptacles.

A full set of RS-232 signals, including modem control is provided. The serial interface is implemented on the ShMM-500.

The serial console default configuration is:

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

Table 9: RS-232 Serial Console Interface Pin assignment

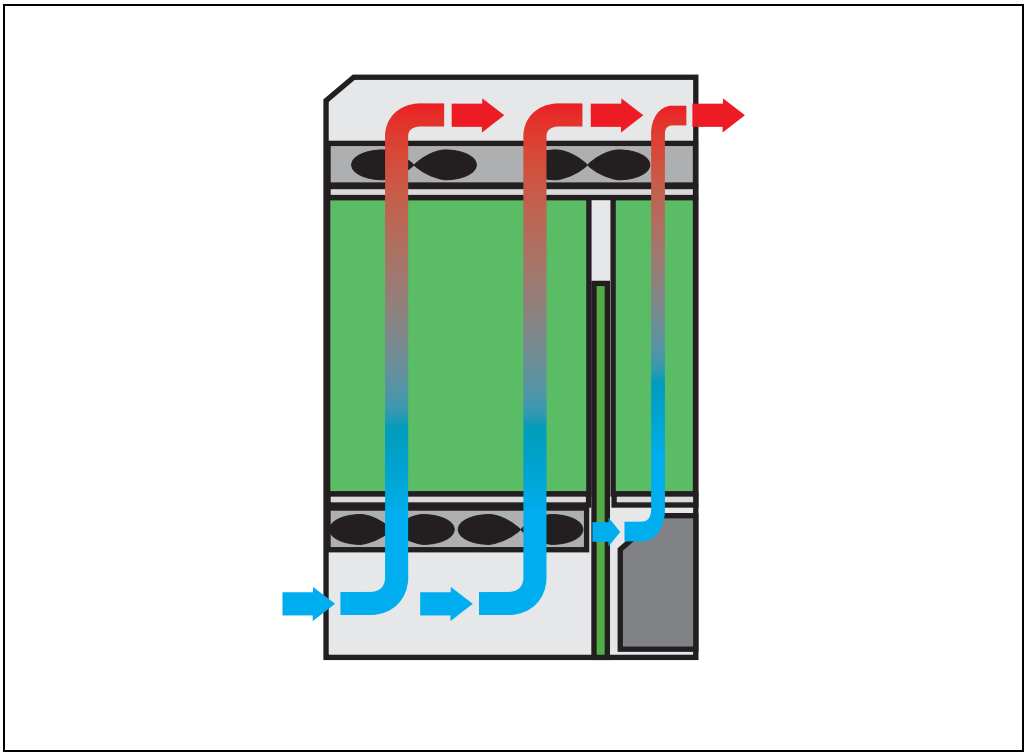
RJ45 Pin	RS-232 Signal	ShMM-500 Signal	Type	Description
1	RTS	RTS	Out	Request To Send
2	DTR	DTR	Out	Data Terminal Ready
3	TxD	TXD0	Out	Transmit Data
4	GND	GND	---	Logic Ground
5	GND	GND	---	Logic Ground
6	RxD	RXD0	In	Receive Data
7	DSR	DSR	In	Data Set Ready
8	CTS	CTS	In	Clear To Send

7 Thermals

7.1 System Airflow Path

The Schroff 14 slot ATCA Shelf provides airflow using two Fan Trays, one below the card cage and one above the card cage. Each Fan Tray has 6 fans moving air from the bottom to the top of the Shelf in a push-pull arrangement. This arrangement provides excellent airflow as well as fault tolerance in the unlikely event of a fan failure.

Figure 15: System Airflow Path



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Overall airflow = 2000 m³/h (1180 CFM)

Front slot airflow = 113 m³/h (67 CFM) at the lowest performing slot

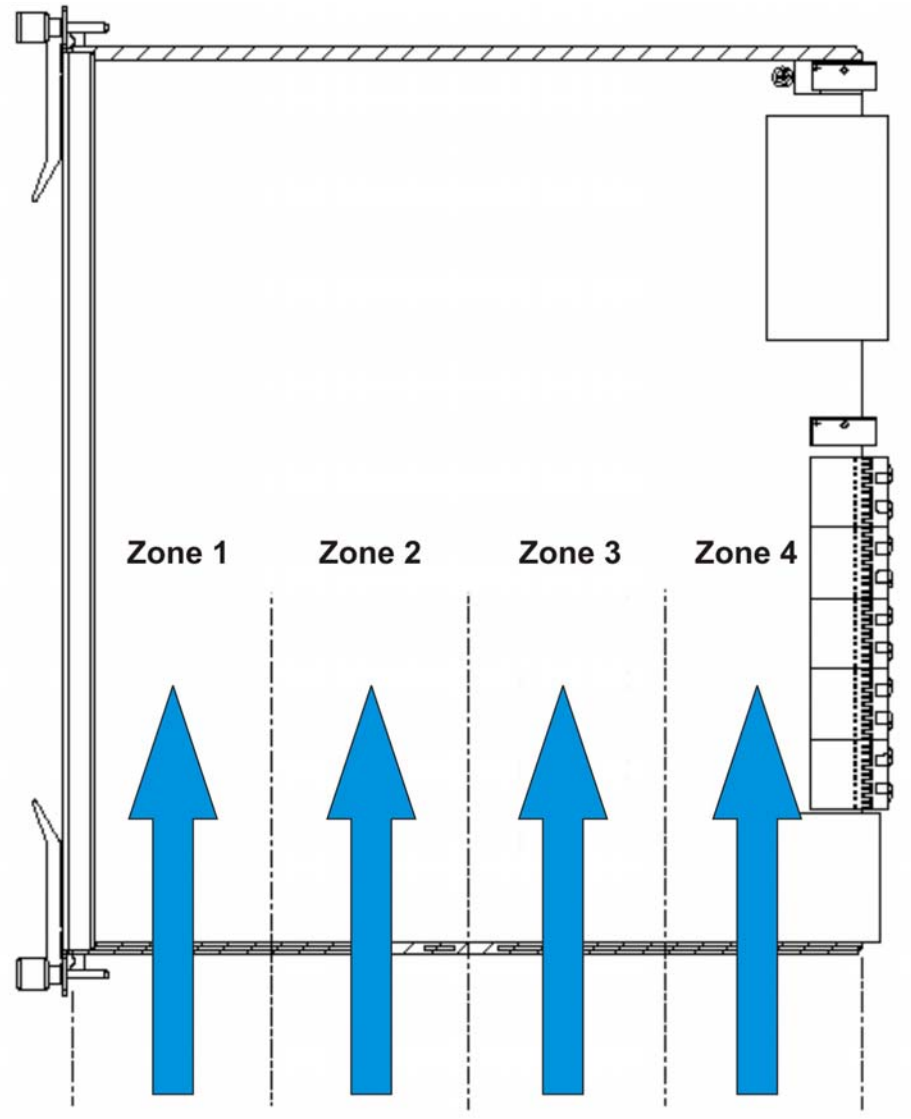
Rear slot airflow = 16 m³/h (9 CFM) at the lowest performing slot

(Air flow measured with CP-TA boards)

The airflow is measured with air filter installed and test boards in each slot. The test boards have a pressure drop of 37 Pa@ 0.85 m³/min for Front Slots and 24.9 Pa@ 0.14 m³/min for RTM Slots.

For further information and explanations see PICMG 3.0 R3.0, Chapter 5.4 and NEBS (GR-63).

Front slot measurement zones



7.2 Front Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

- Front board pressure drop: 37 Pa at 0.85 m³/min

Figure 16: Front Board Air Distribution

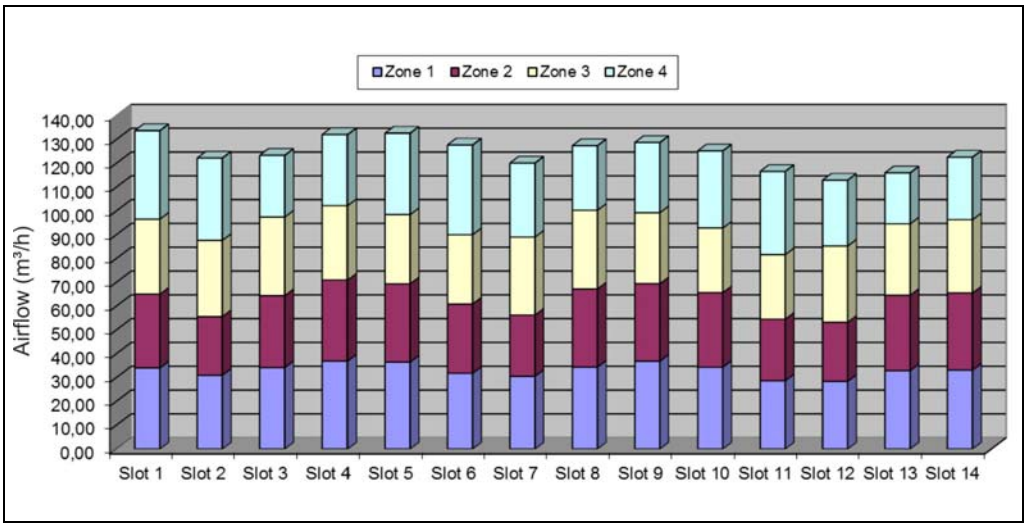


Figure 17: Front Board Air Flow

	Zone 1 [m³/h]	Zone 2 [m³/h]	Zone 3 [m³/h]	Zone 4 [m³/h]	∑ [m³/h]	∑ [cfm]
Slot 1	34,06	31,01	31,54	37,12	**133,72**	**78,66**
Slot 2	31,01	24,66	32,00	34,56	**122,23**	**71,90**
Slot 3	34,27	30,15	33,05	25,89	**123,37**	**72,57**
Slot 4	37,00	34,00	31,26	29,82	**132,09**	**77,70**
Slot 5	36,52	32,91	29,08	34,15	**132,66**	**78,04**
Slot 6	31,82	29,09	29,11	37,70	**127,72**	**75,13**
Slot 7	30,57	25,75	32,73	31,08	**120,13**	**70,66**
Slot 8	34,44	32,83	33,05	27,10	**127,42**	**74,96**
Slot 9	36,92	32,55	29,86	29,43	**128,75**	**75,74**
Slot 10	34,38	31,31	27,16	32,37	**125,23**	**73,66**
Slot 11	28,73	25,83	27,13	34,92	**116,60**	**68,59**
Slot 12	28,44	24,83	32,02	27,63	**112,92**	**66,43**
Slot 13	32,94	31,70	29,96	21,38	**115,99**	**68,23**
Slot 14	33,17	32,42	30,76	26,27	**122,61**	**72,12**
∑ [m³/h]	**464,27**	**419,03**	**428,70**	**429,44**	**1741,43**	**1024,37**

7.3 Rear Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

- Rear board pressure drop: 24 Pa at 0.14 m³/min

Figure 18: Rear Board Air Distribution

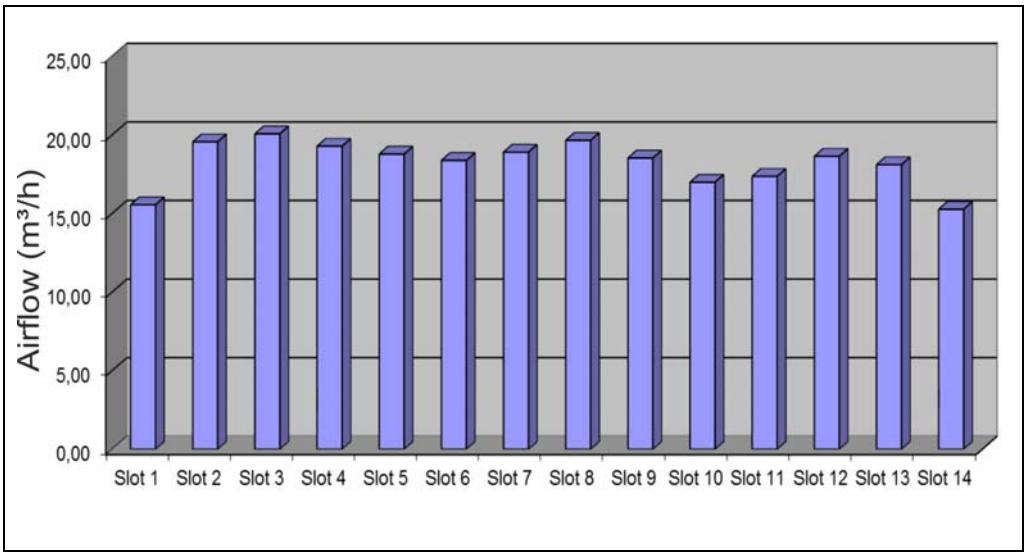


Figure 19: Rear Board Air Flow

	∑ [m³/h]	∑ [cfm]
Slot 1	**15,55**	**9,15**
Slot 2	**19,56**	**11,51**
Slot 3	**20,07**	**11,81**
Slot 4	**19,28**	**11,34**
Slot 5	**18,78**	**11,05**
Slot 6	**18,38**	**10,81**
Slot 7	**18,91**	**11,12**
Slot 8	**19,66**	**11,56**
Slot 9	**18,53**	**10,90**
Slot 10	**16,99**	**9,99**
Slot 11	**17,37**	**10,22**
Slot 12	**18,64**	**10,97**
Slot 13	**18,11**	**10,65**
Slot 14	**15,27**	**8,98**
∑ [m³/h]	**255,09**	**150,05**

8 Power Entry Module (PEM)

Hazardous voltage!

Before working ensure that the power is removed from the power connection cables. When the system is powered on, do NOT touch the power terminals.

The Shelf can be powered using a regular telecommunication power supply of -48/-60 VDC with a VDC return. The specified voltage range is from -40 VDC to -72 VDC.The Shelf supports redundant power supplies but the two supplies should be independently powered.

8.1 Introduction

Two pluggable redundant Power Entry Modules (PEMs) are located at the rear bottom side of the Shelf. Each PEM provides power terminals for a 210 A power feed. Each power feed consists of up to four –48 VDC cables and the corresponding return cables.
Each input feed is divided internally at the PEM in 6 output branches toward the backplane. In this way, each PEM has 1 input feed and 6 output branches.

Over current protection is provided by 50 A fuses in each output branch. The segmentation is shown in *Chapter 8.4, "Power Branches"*.

The power filtering consists of filtered power terminals and a discrete line-filter for each power branch.

The input voltage range for the Shelf is from -40 VDC to -72 VDC.

In each power feed, input voltage and measurement is implemented, by means of dedicated voltage monitor device.

Current measurement is available only as an option.

The PEM provides:

- PCA9555 I/O device for voltage monitoring and Hot Swap functionality
- LM75 temperature sensor
- 24LC256 FRU SEEPROM
- 2 INA220B Current/Voltage measurement devices

These devices are connected to the I²C-bus via an LTC4300 I²C buffer. In order to guarantee a galvanic insulation, I²C-bus insulation devices have provided for the INA220B Current/Voltage Monitors.

To detect a blown fuse, the voltages after the fuses are monitored by threshold comparators. The threshold comparators are coupled to the PCA9555 chip through optical-isolation devices. The threshold for the blown fuse alarm is -29.5 VDC ±2 V.

To indicate to the Shelf Manager the presence of the PEM, a presence signal is grounded by the PEM.

A Hot Swap Push Button and a Blue Hot Swap LED provide Hot Swap functionality.
A red (power failure) and a green (OK) LED provide status indication.

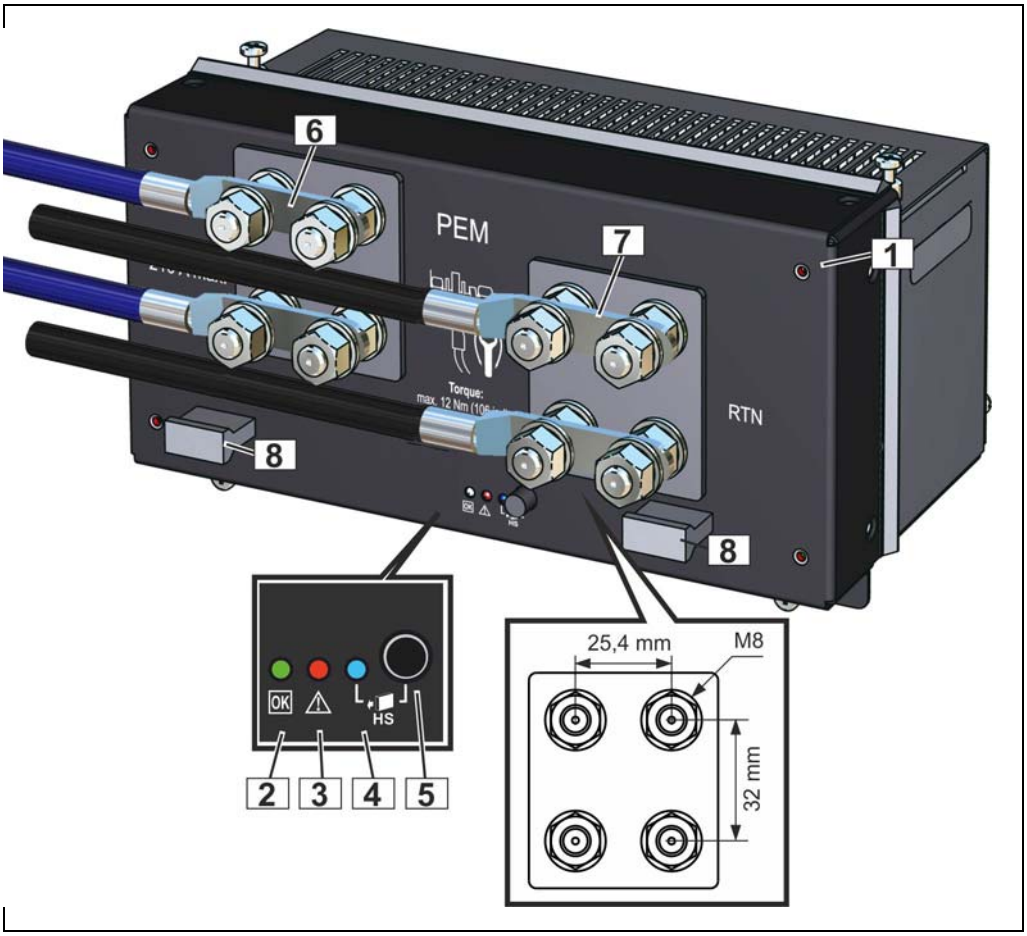
Each of the 6 redundant output branches supply power to a separate part of the ATCA Backplane.

The PEM (together with all shelf related FRUs) are protected against wrong polarity up to +57 V DC, but it does not block wrong polarity voltage being applied to shelf related FRUs and to Zone 1 power wiring of payload slots.

Suppressor diodes are included in the feed chain that provide protection against a K.20 pulse of 500 V being applied to its input (K.20 surge pulse, "Basic level", Table 7, pulse type 7.3, 500 V applied to -48V and -48V RTN branches at the same time against shelf ground) so that PEM itself and other shelf related FRUs can sustain this level of pulse.

8.2 PEM Front View

Figure 20: PEM Front View



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1	PEM	5	Hot-Swap Push Button
2	Status LED „OK“ (green)	6	-48 V Input (-)
3	Status LED „Failure“ (red)	7	RTN Input (+)
4	Hot-Swap LED (blue)	8	Handle

8.3 Specifcations for the Power Cables

As shown in Fig. 20, 2 cables are required for the -48 V and the RTN feed.

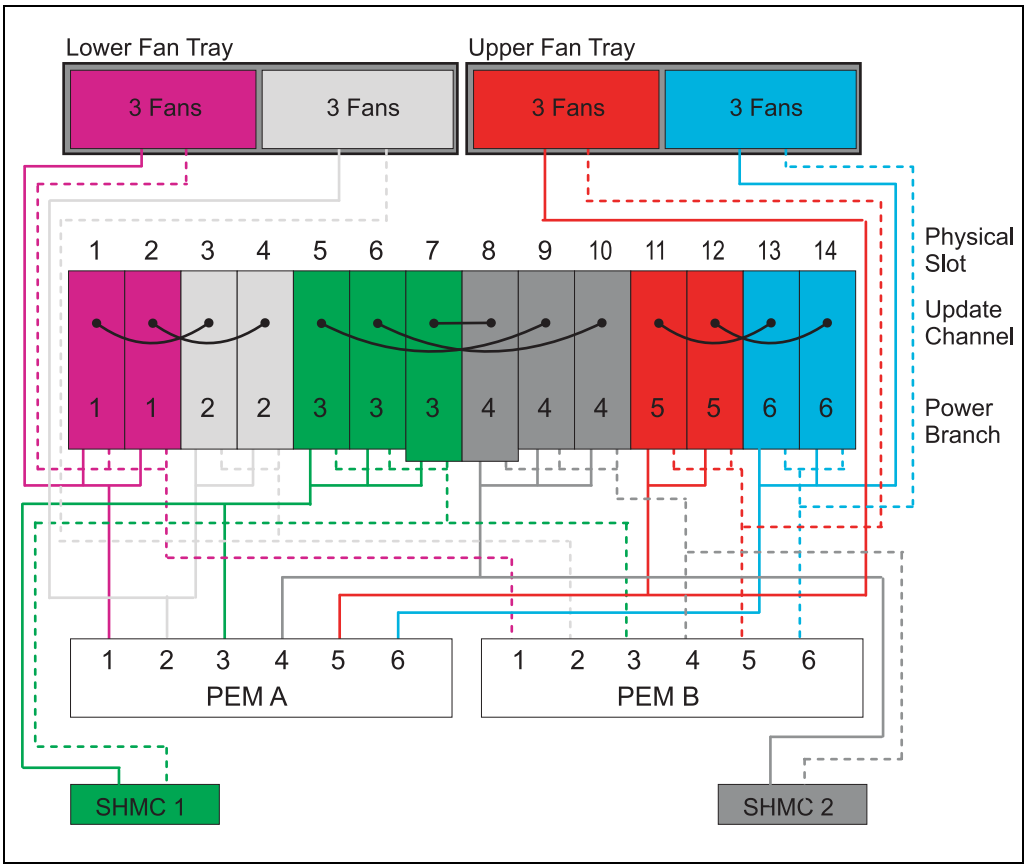
Required cable size: AWG 1/0 (50 mm²), maximum length = 3 m.

Recommended cable lug: Panduit LCDN1/0-56D-X or equivalent.

8.4 Power Branches

The Backplane‘s power supply is divided into 6 power branches. Each of the PEM’s 6 power branches supplies power to a group of slots and a Fan or Shelf Manager. This topology is used to keep the max. current per branch less then 35 A.

Figure 21: Power distribution of the 6 Power Branches within the Shelf


Lower Fan Tray
Upper Fan Tray
3 Fans
3 Fans
3 Fans
3 Fans
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Physical Slot
Update Channel
Power Branch
1 1 2 2 3 3 3 4 4 4 5 5 6 6
1 2 3 4 5 6
PEM A
1 2 3 4 5 6
PEM B
SHMC 1
SHMC 2

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8.5 Slot Power Calculation

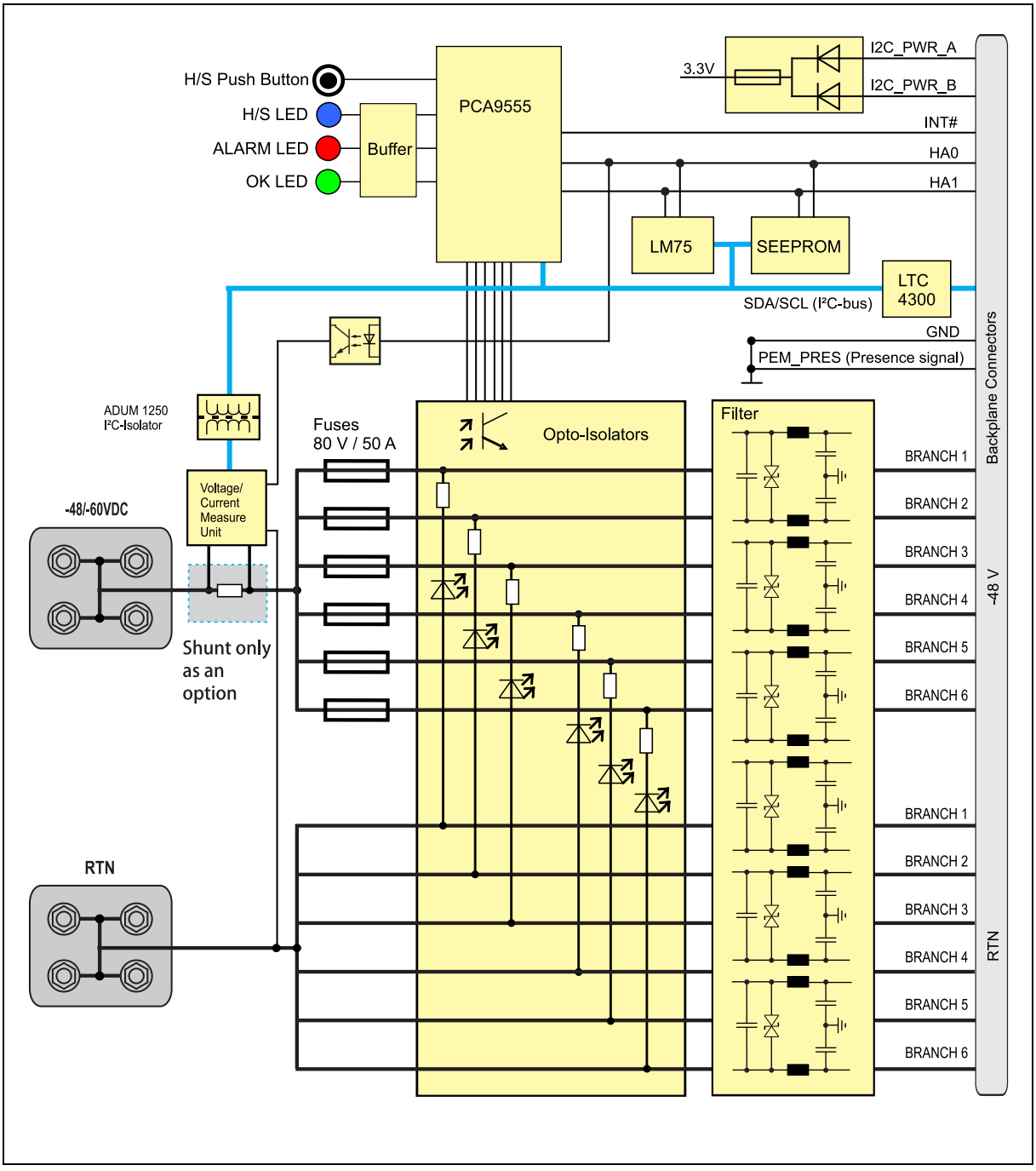
Each branch supplies power to group of slots and/or a Fan Tray or a Shelf Manager (See Figure 18).

The Shelf Manager calculates the maximum branch power by the minimum expected operating voltage (default 40 V) and the maximum branch current (35 A) stored in the Shelf's FRU file.

With the default settings the available branch power is calculated with 1400 W. With the power topology shown in Figure 18, the Shelf can supply a minimum of 450 W per slot (40 V operating voltage, 540 W with 48 V operating voltage.)

8.6 PEM Block Diagram

Figure 22: PEM Block Diagram



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8.7 PEM I²C-bus addresses

Geographic address pins (HA0, HA1) on the PEM Backplane connector determine the I²C addresses of the devices. The I²C devices on the PEMs are connected to channel 4 of the Master-Only I²C-bus of the Shelf Managers.

Table 10: PEM I²C-bus addresses

PEM Location	SEEPROM	LM75	PCA9555
PEM A (Right, view from rear)	0xa8/54	0x98/4c	0x48/24
PEM B (Left, view from rear)	0xaa/55	0x9a/4d	0x4a/25

8.8 PEM I/O Device

The PEM I/O device (PCA9555):

- controls the status of the LEDs
- reads the status of the Hot Swap push button
- reads the status of the -48 VDC inputs

Table 11: PEM PCA 9555 pin assignment

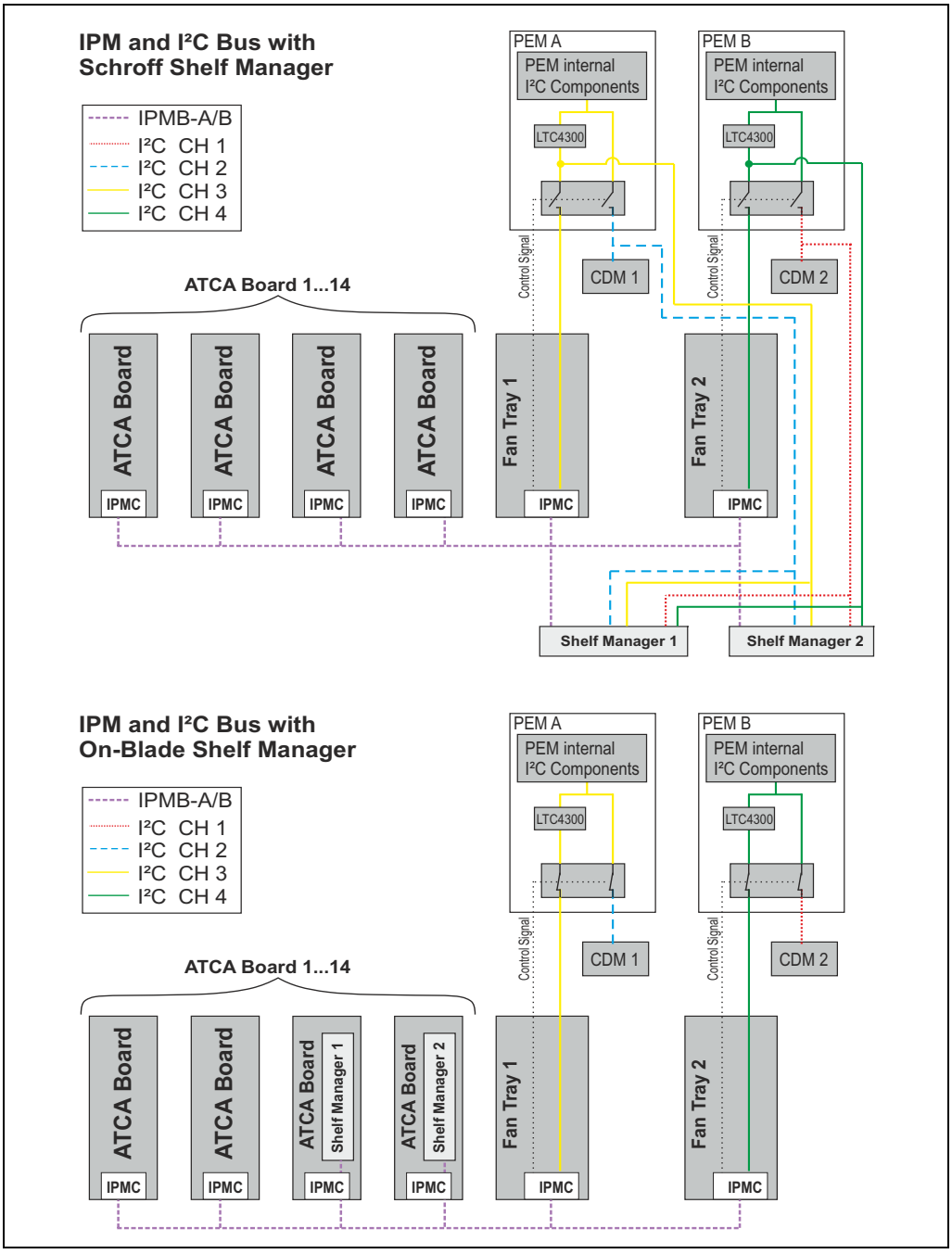
PCA9555 I/O pin	Function	State
0.0	Power Branch 2 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.1	Power Branch 2 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.2	Power Branch 1 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.3	Power Branch 1 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.4	Power Branch 5 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.5	Power Branch 5 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.6	Power Branch 4 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
0.7	Power Branch 4 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.0	Power Branch 3 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.1	Power Branch 3 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.2	Power Branch 6 at input terminal present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.3	Green LED	1=on
1.4	Hot Swap Push-button switch	1=not pushed, 0=pushed
1.5	Red LED	1=on
1.6	Power Branch 6 after the fuse present	-48 V present = 0 -48 V absent = 1 (3.3V)
1.7	Blue LED	1=on

9 Shelf Management

The Schroff ATCA Shelves are designed to work with two redundant Schroff ShMM-ACB-V Shelf Managers in dedicated Shelf Manager slots.

Upon request is also a version with on-blade shelf management available. With on-blade shelf management, the I²C components of the PEMs and the SEEPROM of the CDMs are connected to the internal I²C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

Figure 23: Shelf Management



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9.1 Schroff Shelf Manager ACB-V

These Chapters describe the Shelf Manager hardware. For explicit software documentation see:

- Pigeon Point Shelf Manager User Guide
- Pigeon Point Shelf Manager External Interface Reference
- Schroff Shelf Manager User‘s Manual, Order-no. 63972-243

The documentation is available for registered users at www.schroff.biz

Shelf Manager with bused IPMB: 21596-291 (Product Number)
21596-300 (Catalog Number with packaging)

Shelf Manager with radial IPMB: 21596-292 (Product Number)
21596-301 (Catalog Number with packaging)

The Shelf Managers are not included with the Shelf

The Schroff Shelf Manager ACB-V is a 78 mm x 280 mm board that fits into a dedicated Shelf Manager slot in a Schroff ATCA Shelf.

The Shelf Manager has two main responsibilities:

1 Manage/track the FRU population and common infrastructure of a Shelf, especially the power, cooling and interconnect resources and their usage.

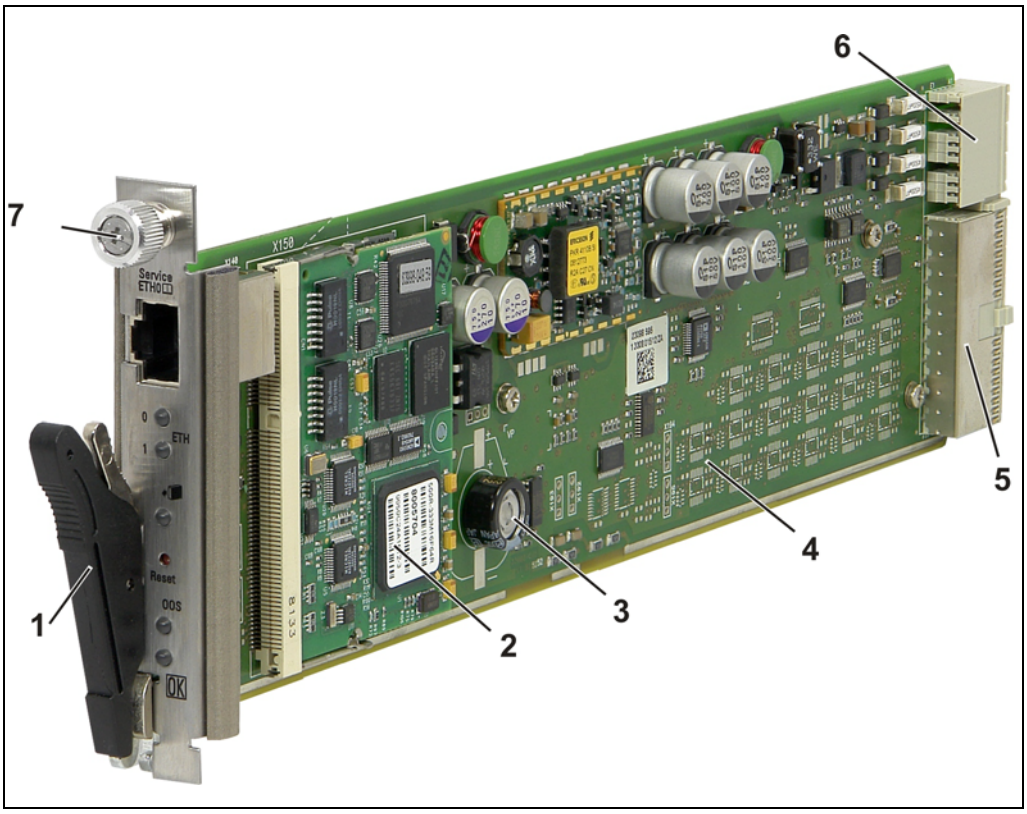
2 Enable the overall System Manager to join in that management/tracking through the System Manager Interface, which is typically implemented over Ethernet.

The Shelf management based on the Pigeon Point Shelf management solution for AdvancedTCA products.
The Shelf management software executes on the Pigeon Point **Sh**elf **M**anagement **M**ezzanine **500** (**ShMM-500**), a compact SO-DIMM form-factor module, installed on the ACB-V carrier board.
The ACB-V carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-500. These facilities include I²C-based hardware monitoring/control and GPIO expander devices.

The ACB-V individual Ethernet connections to both Base Hubs (ShMC cross connect).

The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Schroff Shelf. The Shelf Manager communicate with the non-intelligent FRUs over I²C busses and expose the sensors for these FRUs at IPMB address 0x20.

Figure 24: Schroff Shelf Manager



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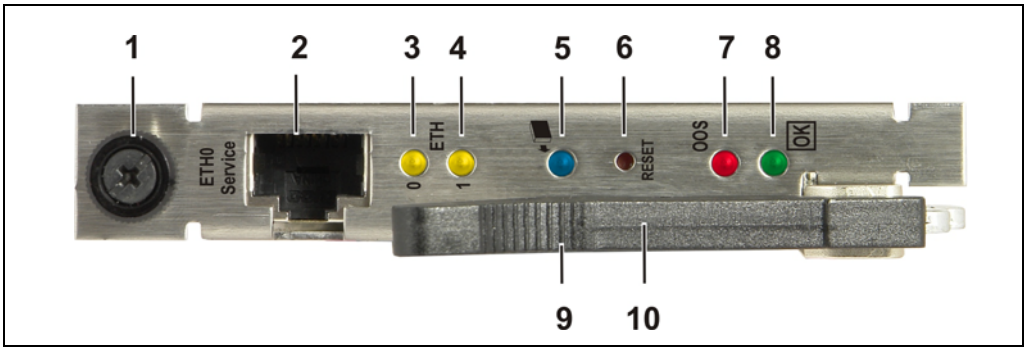
1	Extraction handle	5	Backplane Connector (J2)
2	ShMM-500	6	Backplane Connector (J1)
3	RTC Backup Capacitor	7	Fixing screw
4	ACB-V Carrier Board		

9.2 Front Panel Components

Figure 25: Shelf Manager Front Panel Components



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1	Fixing screw	6	RESET push button
2	ETH 0 Ethernet Service Connector (RJ45)	7	Shelf Manager Status LED (red) - Red = Out of Service (OOS)
3	ETH 0 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	8	Shelf Manager Status LED (green) - Solid Green = in Service, active Shelf Manager - Blinking = in Service, Backup Shelf Manager
4	ETH 1 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	9	Hot Swap Switch - Activated by extraction handle
5	Hot Swap LED (blue) - Solid Blue = ready to remove - Blinking = Hot Swap is requested - Off = No Hot Swap possible	10	Extraction handle

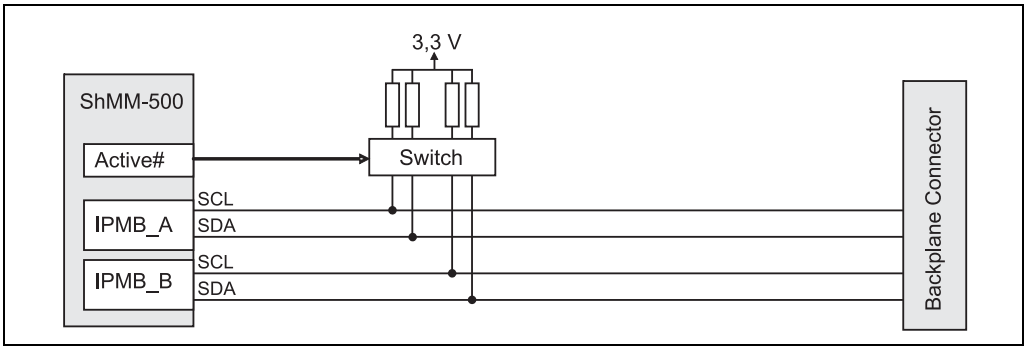
9.3 Bused IPMB Interface

Only Shelf Managers with Product Number: 21596-291

The ShMM-500 provides two IPMBs. The IPMB-A and IPMB-B from the ShMM-500 are routed directly to the Backplane connector. The ATCA Backplane buses the two IPMBs to the ATCA boards.

The Active# signal of the ShMM-500 is used to switch on/off the pull-up resistors of the IPMBs.

Figure 26: Block diagram bused IPMB



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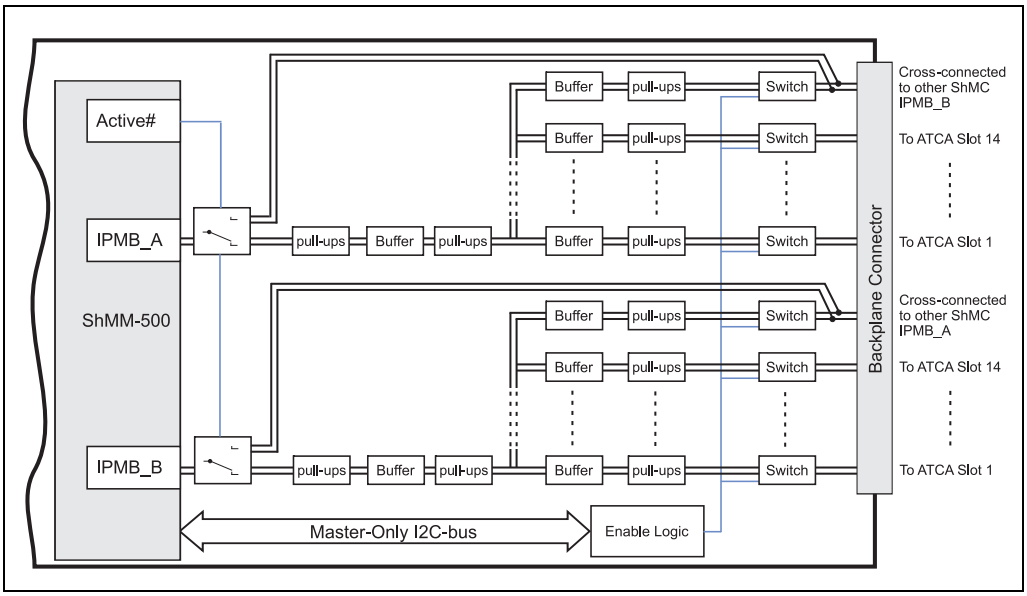
9.4 Radial IPMB Interface

Only Shelf Managers with Product Number: 21596-292

The IPMB-A and IPMB-B buses from the ShMM-500 are routed through IPMB buffers and switches to the Backplane connector J2. The ATCA Backplane connects the individual IPMBs to the ATCA boards.

Figure 27: Block diagram radial IPMB



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9.4.1 Radial IPMB Enables

If installed, the ShMM-ACB-V implements the FET enables for the radial IPMB with three Philips PCA9555 16-bit GPIO port devices. See the table below for the enable bit to IPMB channel mapping.

Table 12: Radial IPMB enable-bit to IPMB-channel mapping

To Backplane Logical slot	IPMB-Channel	Enable Signal	I2C I/O Port on PCA9555	IPMB Port	J2 Pin
	CROSS A	EN10	U11 0x42 I/O 0.2	CROSS_SCL-SDA_A	C20-D20
	CROSS B	EN25	U07 0x40 I/O 1.4	CROSS_SCL-SDA_B	A18-A17
Slot 1	Channel A	EN33	U13 0x4e I/O 1.0	SCL-SDA_A01_R	C13-A13
Slot 2	Channel A	EN04	U07 0x40 I/O 0.0	SCL-SDA_A02_R	E22-D22
Slot 3	Channel A	EN13	U11 0x42 I/O 0.1	SCL-SDA_A03_R	A12-A11
Slot 4	Channel A	EN12	U11 0x42 I/O 0.4	SCL-SDA_A04_R	C16-B16
Slot 5	Channel A	EN14	U11 0x42 I/O 0.0	SCL-SDA_A05_R	C12-B12
Slot 6	Channel A	EN08	U07 0x40 I/O 1.3	SCL-SDA_A06_R	E14-D14
Slot 7	Channel A	EN07	U07 0x40 I/O 1.2	SCL-SDA_A07_R	C14-B14
Slot 8	Channel A	EN05	U07 0x40 I/O 1.0	SCL-SDA_A08_R	E12-D12
Slot 9	Channel A	EN11	U11 0x42 I/O 0.5	SCL-SDA_A09_R	A16-A15
Slot 10	Channel A	EN06	U07 0x40 I/O 1.1	SCL-SDA_A10_R	E13-D13
Slot 11	Channel A	EN02	U07 0x40 I/O 1.7	SCL-SDA_A11_R	C18-B18
Slot 12	Channel A	EN03	U07 0x40 I/O 0.1	SCL-SDA_A12_R	C22-B22
Slot 13	Channel A	EN09	U11 0x42 I/O 0.3	SCL-SDA_A13_R	B19-A19
Slot 14	Channel A	EN01	U07 0x40 I/O 1.6	SCL-SDA_A14_R	E18-D18
Slot 15	Channel A	EN15	U11 0x42 I/O 1.6	SCL-SDA_A15_R	C9-D9
Slot 16	Channel A	EN16	U11 0x42 I/O 1.7	SCL-SDA_A16_R	D10-C10
Slot 1	Channel B	EN29	U07 0x40 I/O 0.5	SCL-SDA_B01_R	B20-A20
Slot 2	Channel B	EN30	U07 0x40 I/O 0.4	SCL-SDA_B02_R	E21-D21
Slot 3	Channel B	EN21	U11 0x42 I/O 1.3	SCL-SDA_B03_R	C11-B11
Slot 4	Channel B	EN28	U07 0x40 I/O 0.6	SCL-SDA_B04_R	E17-D17
Slot 5	Channel B	EN31	U07 0x40 I/O 0.3	SCL-SDA_B05_R	C21-B21
Slot 6	Channel B	EN27	U07 0x40 I/O 0.7	SCL-SDA_B06_R	E16-D16
Slot 7	Channel B	EN34	U13 0x4e I/O 1.1	SCL-SDA_B07_R	A14-B13
Slot 8	Channel B	EN22	U11 0x42 I/O 1.2	SCL-SDA_B08_R	E11-D11
Slot 9	Channel B	EN24	U11 0x42 I/O 0.6	SCL-SDA_B09_R	E20-E19
Slot 10	Channel B	EN18	U11 0x42 I/O 1.1	SCL-SDA_B10_R	E15-D15
Slot 11	Channel B	EN26	U07 0x40 I/O 1.5	SCL-SDA_B11_R	C17-B17
Slot 12	Channel B	EN23	U11 0x42 I/O 0.7	SCL-SDA_B12_R	C19-D19
Slot 13	Channel B	EN32	U07 0x40 I/O 0.2	SCL-SDA_B13_R	A22-A21
Slot 14	Channel B	EN17	U11 0x42 I/O 1.0	SCL-SDA_B14_R	C15-B15
Slot 15	Channel B	EN19	U11 0x42 I/O 1.4	SCL-SDA_B15_R	A9-B9
Slot 16	Channel B	EN20	U11 0x42 I/O 1.5	SCL-SDA_B16_R	B10-A10

9.5 Ethernet Channels

The Shelf Manager provides two 10/100 Ethernet interfaces. The first Ethernet channel (ETH0) is routed either to the RJ45 connector on the front panel or to the ATCA Backplane connector J2 (default setting). The routing depends on the settings of the rocker switches S101 and S102. The ATCA Backplane routes ETH0 from the connector J2 to the ShMC port on the corresponding Base Interface Hub board. The second Ethernet channel (ETH1) is routed to the other Base Interface Hub board (ShMC Cross Connect). Both Ethernet ports support 10 Mb (10BASE-T) and 100 Mb (100BASE-TX) connections.

The front panel ETH0 Ethernet connector is intended for service use only or for debugging purposes in laboratory environment. The computer which is connected to this interface must be located nearby the shelf manager with an Ethernet cable that is not longer than 10m. The front panel Ethernet connector MUST NOT be connected to a Telecommunication Network Circuit that leaves the building.

The ETH0 interface of the shelf manager can manually be switched between the front panel RJ45 connector (“Front”-position of the rocker-switch) and the backplane connector going to the hub board base interface (“Back”-position of the rocker-switch).

The ATCA specification requires a base channel interface between the shelf manager and the Hub board. The ETH0 rocker-switch MUST be in “Back”-position in normal operation of the shelf manager in an ATCA-shelf.

Figure 28: Switches S101 and S102 shown in default position

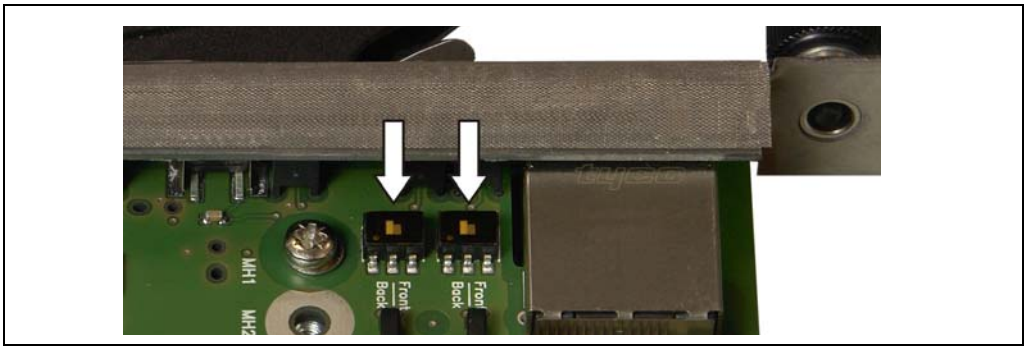

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Figure 29: Shelf Manager Cross Connect

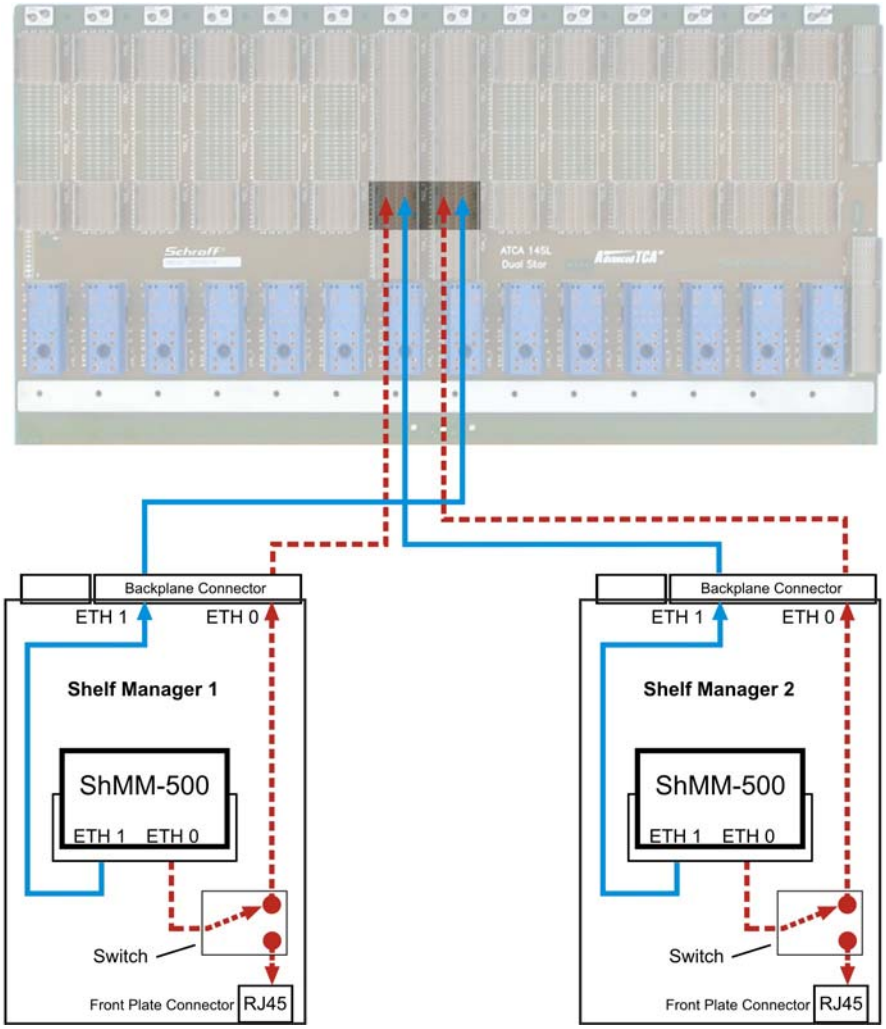

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Table 13: Connector (P23) pin assignment for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

9.6 Shelf Manager RS-232 Console Serial Interface

A serial interface is implemented on the ShMM-500.The Shelf Manager provides an RS-232 console interface that provides a full set of RS-232 signals, including modem control. These signals are routed through the Shelf Manager backplane connector to a RJ45 connector on the front panel of the lower Fan Tray.

The serial console default configuration is:

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

9.7 Front Panel RESET push button

The Shelf Manager provides a RESET push button on the front panel. It is connected to the ShMM-500's /MR signal.

Pushing the RESET button will reset the Shelf Manager

9.8 Hot Swap Interface

The Shelf Manager provides a Hot Swap interface allowing the Shelf Manager to be replaced without powering down the Shelf. The Hot Swap interface is implemented using the on-ShMM-500 CPLD device. The interface is composed of three components:

- Hot Swap switch at injector/ejector handle
- Presence signal indicating that the Shelf Manager is fully seated in its backplane connector
- Hot Swap LED

9.8.1 Hot Swap Switch

The injector/ejector micro-switch provides an input (HS_LATCH) to the ShMM-500 CPLD, which is responsible for taking appropriate hardware actions as well as signaling the condition to the software.

Micro-Switch	HS_LATCH Signal	HSL Bit in the CPLD	Condition
Open	High	0	Handle opened
Closed	Low	1	Handle closed

9.8.2 Board Presence

Each Shelf Manager grounds the PRES_1# input signal of the other Shelf Manager when installed into the ATCA Backplane. This signal is responsible for taking appropriate hardware action as well as signaling the condition to the software.

9.8.3 Hot Swap LED

The Shelf Manager provides a a blue Hot Swap LED. The LED indicates when it is safe to "remove" the Shelf Manager from a powered Shelf.

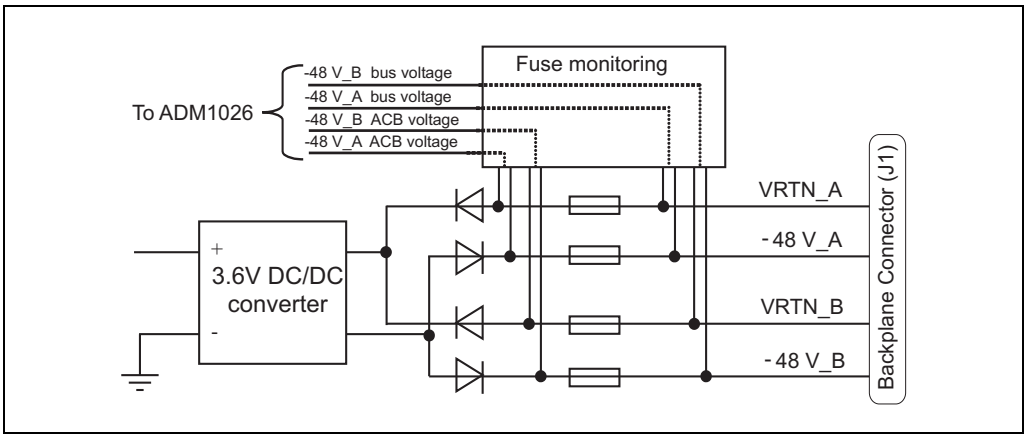
Table 14: Hot Swap LED

LED State	Condition
Off	The Shelf Manager is not ready to be removed/disconnected from the Shelf
Solid Blue	The Shelf Manager is ready to be removed/disconnected from the Shelf
Long-blink	The Shelf Manager is activating itself
Short-blink	Deactivation has been requested

9.9 Input Voltage and Fuse Monitoring

To detect a missing supply voltage as well as a blown fuse the Shelf Manager provides voltage monitoring and control functions. The -48 VDC input voltage before and behind the fuses are connected to the ADM1026 chip through optical-isolation devices.

Figure 30: Input Voltage and Fuse Monitoring



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Signal	description
-48 V_A bus voltage	Indicates the presence of the –48 V_A / VRTN_A at the backplane connector (J1). This signal is connected to pin 46 of the ADM1026
-48 V_A ACB voltage	Indicates the presence of the –48 V_A / VRTN_A behind the Shelf Manager's mains fuse. This signal is connected to pin 44 of the ADM1026
-48 V_B bus voltage	Indicates the presence of the –48 V_B / VRTN_B at the backplane connector (J1). This signal is connected to pin 45 of the ADM1026
-48 V_B ACB voltage	Indicates the presence of the –48 V_B / VRTN_B behind the Shelf Manager's mains fuse. This signal is connected to pin 43 of the ADM1026

9.10 Hardware Address

The Shelf Manager reads the hardware address and parity bit from the backplane connector of the Dedicated Shelf Manager slot. Geographic address pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.
Primary Shelf Manager (upper)	0x08	0x10
Secondary Shelf Manager (lower)	0x09	0x12

9.11 Redundancy Control

The Shelf Manager supports redundant operation with automatic switchover using redundant Shelf Managers. In a configuration where two Shelf Manager are present, one acts as the active Shelf Manager and the other as a standby. The Shelf Managers monitor each other and either can trigger a switchover if necessary.

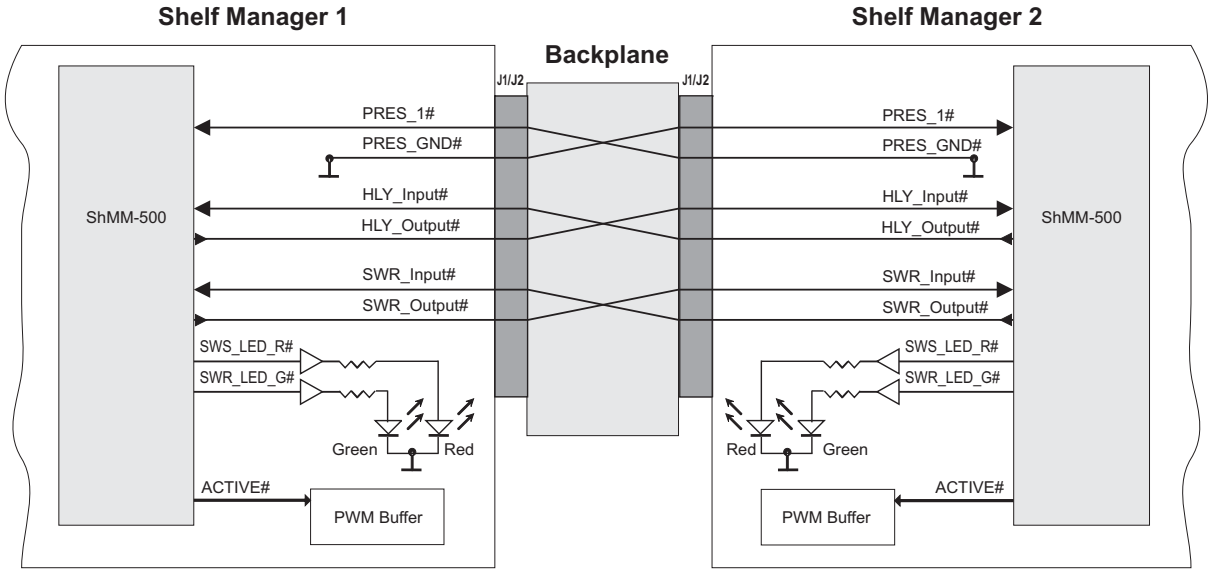
9.11.1 Hardware Redundancy Interface

The hardware redundancy interfaces of the Shelf Managers are as follows:

- Cross connected Shelf Manager present input (PRES_1#) and output (PRES_GND#)
- Cross connected Shelf Manager health input (HLY_Input#) and output (HLY_Output#)
- Cross connected negotiation input (SWR_Input#) and output (SWR_Output#)
- Active output from the ShMM-500 (ACTIVE#) that is used by the Shelf Manager to enable interfaces that must be exclusively driven by the active Shelf Manager, specifically PWM and fan tachometer buffers
- Two status LEDs using the SWS_LED_G# (Green) and SWS_LED_R# (Red) signals
- The PRES_1# signal is grounded on the redundant Shelf Manager. This indicates both Shelf Managers the presence of the other.

The figure below shows the hardware redundancy interface of the Shelf Manager.

Figure 31: Shelf Manager redundancy control



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9.12 Command Line Interface (CLI)

The Command Line Interface (CLI) connects to and communicates with the IPM-devices of the Shelf, the boards, and the Shelf Manager.
The CLI is an IPMI-based library of commands, service personnel or system administrators can access the CLI through Telnet, SSH, or the Shelf Managers serial port on the SAP.
With the CLI, users can access information about the current system status including sensor values, threshold settings etc.
Users can also access and modify Shelf- and Shelf Manager configurations, perform actions on a FRU a.e. set fan speeds etc.

The default user account is "root" and there is no password.
The default IP address of the primary Shelf Manager is 192.168.0.2

To access all sensor data you have to connect to the active Shelf Manager!

9.12.1 Basic CLI Commands

Service personnel can read system information, FRU information and sensor datas with the following basic commands. For a full list of all CLI commands refer to the Pigeon Point Shelf Manager External Interface Reference Manual.

- **Change IP address of the primary Shelf Manager:**

```
clia setlanconfig channel ip value
```

Value represents the IP address in dotted decimal notation.

```
clia setlanconfig 1 ip 192.168.0.2
```

- **Display the Shelf Managers firmware version:**

```
clia version
```

Info: To get a complete list of all information just type in "`version`".

- **List all IPM Controllers in a Shelf:**

```
clia ipmc
```

- **List all boards in the Shelf:**

```
clia board
```

- **List all sensors on a board:**

```
clia sensor IPMI-address
```

- **List only sensors which are outside of established thresholds:**

```
clia sensor -t
```

- **Get data (value) from a sensor on a board:**

```
clia sensordata IPMI-address sensor-number
```

- **Display the FRU information in a board:**

  ```
  clia fruinfo IPMI-address FRU-id
  ```

- **Change the speed for a Fan Tray:**

  ```
  clia setfanlevel IPMI-address Fru-id speed
  ```

Info: The value for the speed is from 0 to 15.

- **Display the contents of the System Event Log (SEL):**

  ```
  clia sel
  ```

- **Clear the System Event Log (SEL):**

  ```
  clia sel clear
  ```

9.13 Firmware Update

The Shelf Management software is stored in the FLASH memory on the ShMM-500. The software is:

U-boot
sentry.kernel
sentry.rfs

The U-boot program is usually permanent and allows the user to configure the software and network environment of the ShMM-500 and install new software from a network server. Sentry.kernel is the ShMM-500's Linux kernel and sentry.rfs is the ShMM-500's root file system.

A detailed instruction on how to reprogram the Shelf Manager is distributed with each new Firmware release.

9.14 Sensor Table

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
10	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
10	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
10	2	0	Local Temp	Temperature	0x01	Threshold	This sensor measures the local temperature.
10	3	0	3V3_local	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
10	4	0	I2C_PWR_B	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.
10	5	0	I2C_PWR_A	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.
10	6	0	VBAT	Voltage	0x02	Threshold	This sensor measures the voltage of the hold-up capacitor on the local shelf manager in volts.
10	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A at the shelf manager backplane connector.
10	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B at the shelf manager backplane connector.
10	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A behind the shelf manager's main fuse.
10	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B behind the shelf manager's main fuse.
10	20	0	20V AUX	Entity Presence	0x25	Discrete	This sensor indicates the presence of 20 V aux voltage on shelf manager.
10	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_A input fuse on the shelf manager.
10	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_B input fuse on the shelf manager.
10	128	0	CPLD State	OEM reserved	0xde	Discrete	This sensor indicates the high-level redundancy state of the ShMM, along with the state of the low-level redundancy bits exposed by the CPLD, and redun-dancy-related exceptional conditions in the CPLD, if any.
10	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	This sensor indicates the reason for the last reboot.
12	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
12	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
12	2	0	Local Temp	Temperature	0x01	Threshold	This sensor measures the local temperature.
12	3	0	3V3_local	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
12	4	0	I2C_PWR_B	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
12	5	0	I2C_PWR_A	Voltage	0x02	Threshold	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.
12	6	0	VBAT	Voltage	0x02	Threshold	This sensor measures the voltage of the hold-up capacitor on the local shelf manager in volts.
12	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A at the shelf manager back-plane connector.
12	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B at the shelf manager back-plane connector.
12	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_A behind the shelf man-ager's main fuse.
12	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	This sensor indicates the presence of the -48 V_B behind the shelf man-ager's main fuse.
12	20	0	20V AUX	Entity Presence	0x25	Discrete	This sensor indicates the presence of 20 V aux voltage on shelf manager.
12	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_A input fuse on the shelf man-ager.
12	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	This sensor indicates the state of -48 V_B input fuse on the shelf man-ager.
12	128	0	CPLD State	OEM reserved	0xde	Discrete	This sensor indicates the high-level redundancy state of the ShMM, along with the state of the low-level redun-dancy bits exposed by the CPLD, and redun-dancy-related exceptional condi-tions in the CPLD, if any.
12	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	This sensor indicates the reason for the last reboot.
20	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 0.
20	0	3	HPI Sys Event	OEM reserved	0xdb	Discrete	The purpose is to enhance the interac-tion between the shelf manager and Pigeon Point HPI implementa-tions: IntegralHPI and Pigeon Point OpenHPI. This sensor sends IPMI events in a special format to signal HPI implementations that changes have occurred within the shelf manager.
20	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state. (Only bussed IPM Bus)
20	2	0	FRU 1 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 1.
20	3	0	FRU 2 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 2.
20	4	0	FRU 3 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 3.
20	5	0	FRU 4 HOT_SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states for FRU 4.
20	6	0	IPMB LINK 1	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 1 state. (Only radial IPM Bus)
20	7	0	IPMB LINK 2	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 2 state. (Only radial IPM Bus)
20	8	0	IPMB LINK 3	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 3 state. (Only radial IPM Bus)

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
20	9	0	IPMB LINK 4	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 4 state. (Only radial IPM Bus)
20	10	0	IPMB LINK 5	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 5 state. (Only radial IPM Bus)
20	11	0	IPMB LINK 6	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 6 state. (Only radial IPM Bus)
20	12	0	IPMB LINK 7	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 7 state. (Only radial IPM Bus)
20	13	0	IPMB LINK 8	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 8 state. (Only radial IPM Bus)
20	14	0	IPMB LINK 9	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 9 state. (Only radial IPM Bus)
20	15	0	IPMB LINK 10	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 10 state. (Only radial IPM Bus)
20	16	0	IPMB LINK 11	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 11 state. (Only radial IPM Bus)
20	17	0	IPMB LINK 12	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 12 state. (Only radial IPM Bus)
20	18	0	IPMB LINK 13	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 13 state. (Only radial IPM Bus)
20	19	0	IPMB LINK 14	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 14 state. (Only radial IPM Bus)
20	20	0	IPMB LINK 15	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 15 state. (Only radial IPM Bus)
20	21	0	IPMB LINK 16	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 16 state. (Only radial IPM Bus)
20	22	0	IPMB LINK 17	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link 17 state. (Only radial IPM Bus)
20	119	0	TelcoAlarmInput	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.
20	131	0	TELCO Alarms	OEM reserved	0xdf	Discrete	This sensor indicates the presence of critical, major and minor alarm .
20	132	0	BMC Watchdog	Watchdog 2	0x23	Discrete	BMC watchdog sensor.
20	133	0	SYSTEM EVENT	System Event	0x12	Discrete	System event sensor.
20	135	0	FT Oper.Status	Management Sub-syst. Health	0x28	Discrete	This sensor monitors if all the fan trays are operational or if some fan trays is not operation.
20	136	0	Cooling State	Management Sub-syst. Health	0x28	Discrete	This sensor monitors the cooling status.
20	137	0	Fans State	Management Sub-syst. Health	0x28	Discrete	This sensor monitors the fan status.
20	138	0	SHM Redundancy	Management Sub-syst. Health	0x28	Discrete	This sensor monitors the shelf manager redundancy status.
20	140	0	PEM A Temp	Temperature	0x01	Threshold	This sensor measures the PEM A temperature.
20	141	0	PEM B Temp	Temperature	0x01	Threshold	This sensor measures the PEM B temperature.
20	150	0	Air Filter	Entity Presence	0x25	Discrete	This sensor checks the presence of the air filter.
20	151	0	CDM 1 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of CDM 1.
20	152	0	CDM 2 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of CDM 2.
20	153	0	PEM A Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of PEM A
20	154	0	PEM B Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of PEM B.
20	155	0	Fan Tray 1 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of fan tray 1. (lower fan tray)
20	156	0	Fan Tray 2 Pres	Entity Presence	0x25	Discrete	This sensor indicates the presence of fan tray 2. (upper fan tray)

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
20	160	0	PEM A Voltage	Voltage	0x02	Threshold	This sensor measures the output voltage of PEM A.
20	161	0	PEM A Current	Current	0x03	Threshold	This sensor measures the output current of PEM A. (Optional)
20	162	0	PEM A Power	Power Supply	0x08	Threshold	This sensor measures the input power of PEM A in the past hour. (Optional)
20	163	0	PEM A Branch 1	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM A.
20	164	0	PEM A Branch 2	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM A.
20	165	0	PEM A Branch 3	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM A.
20	166	0	PEM A Branch 4	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM A.
20	167	0	PEM A Branch 5	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 5 of PEM A.
20	168	0	PEM A Branch 6	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 6 of PEM A.
20	170	0	PEM B Voltage	Voltage	0x02	Threshold	This sensor measures the output voltage of PEM B.
20	171	0	PEM B Current	Current	0x03	Threshold	This sensor measures the output current of PEM B. (Optional)
20	172	0	PEM B Power	Power Supply	0x08	Threshold	This sensor measures the input power of PEM B in the past hour. (Optional)
20	173	0	PEM B Branch 1	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM B.
20	174	0	PEM B Branch 2	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM B.
20	175	0	PEM B Branch 3	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM B.
20	176	0	PEM B Branch 4	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM B.
20	177	0	PEM B Branch 5	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 5 of PEM B.
20	178	0	PEM B Branch 6	Entity Presence	0x25	Discrete	This sensor indicates the presence of the voltage after the fuse on branch 6 of PEM B.
20	180	0	Shelf Power	Power Supply	0x08	Threshold	This sensor measures the total input power of the shelf as a sum of both PEMs.
5a = Lower Fan Tray							
5a	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states.
5a	1	0	Version Change	reserved	0x2b	Discrete	This sensor indicates a hardware or software change.
5a	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
5a	3	0	Telco Alarm	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
5a	4	0	+3.3V	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
5a	5	0	+3.6V External	Voltage	0x02	Threshold	This sensor measures the external 3.6 V voltage in volts.
5a	6	0	Temp Controller	Temperature	0x01	Threshold	This sensor measures the temperature of the IPM Controller.
5a	7	0	Temp_In Left	Temperature	0x01	Threshold	This sensor measures the left inlet temperature.
5a	8	0	Temp_In Center	Temperature	0x01	Threshold	This sensor measures the central inlet temperature.
5a	9	0	Temp_In Right	Temperature	0x01	Threshold	This sensor measures the right inlet temperature.
5a	10	0	Fan Tach. 1	Fan	0x04	Threshold	This sensor indicates the speed of the fan 1 (RPM).
5a	11	0	Fan Tach. 2	Fan	0x04	Threshold	This sensor indicates the speed of the fan 2 (RPM).
5a	12	0	Fan Tach. 3	Fan	0x04	Threshold	This sensor indicates the speed of the fan 3 (RPM).
5a	13	0	Fan Tach. 4	Fan	0x04	Threshold	This sensor indicates the speed of the fan 4 (RPM).
5a	14	0	Fan Tach. 5	Fan	0x04	Threshold	This sensor indicates the speed of the fan 5 (RPM).
5a	15	0	Fan Tach. 6	Fan	0x04	Threshold	This sensor indicates the speed of the fan 6 (RPM).
5a	16	0	Air Filter	OEM reserved	0xc0	Discrete	This sensor checks the presence of the air filter.
5a	17	0	-48V A Branch 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 1 at the lower fan tray connector.
5a	18	0	-48V A Fused 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 1 after fan tray's main fuse.
5a	19	0	-48V A Branch 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 2 at the lower fan tray connector.
5a	20	0	-48V A Fused 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 2 after fan tray's main fuse.
5a	21	0	-48V B Branch 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 1 at the lower fan tray connector.
5a	22	0	-48V B Fused 1	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 1 after fan tray's main fuse.
5a	23	0	-48V B Branch 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 2 at the lower fan tray connector.
5a	24	0	-48V B Fused 2	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 2 after fan tray's main fuse.
5c = Upper Fan Tray							
5c	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	This sensor returns the hot-swap states.
5c	1	0	Version Change	reserved	0x2b	Discrete	This sensor indicates a hardware or software change.
5c	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	This sensor returns the IPMB link state.
5c	3	0	Telco Alarm	TELCO Alarm Input	0xf4	Discrete	Telco alarm input sensor.

IPMC	Nr.	LUN	Name	Type	Type-Code	Class	Description
5c	4	0	+3.3V	Voltage	0x02	Threshold	This sensor measures the local 3.3 V voltage in volts.
5c	5	0	+3.6V External	Voltage	0x02	Threshold	This sensor measures the external 3.6 V voltage in volts.
5c	6	0	Temp Controller	Temperature	0x01	Threshold	This sensor measures the temperature of the IPM Controller.
5c	7	0	Temp_In Left	Temperature	0x01	Threshold	This sensor measures the left inlet temperature.
5c	8	0	Temp_In Center	Temperature	0x01	Threshold	This sensor measures the central inlet temperature.
5c	9	0	Temp_In Right	Temperature	0x01	Threshold	This sensor measures the right inlet temperature.
5c	10	0	Fan Tach. 1	Fan	0x04	Threshold	This sensor indicates the speed of the fan 1 (RPM).
5c	11	0	Fan Tach. 2	Fan	0x04	Threshold	This sensor indicates the speed of the fan 2 (RPM).
5c	12	0	Fan Tach. 3	Fan	0x04	Threshold	This sensor indicates the speed of the fan 3 (RPM).
5c	13	0	Fan Tach. 4	Fan	0x04	Threshold	This sensor indicates the speed of the fan 4 (RPM).
5c	14	0	Fan Tach. 5	Fan	0x04	Threshold	This sensor indicates the speed of the fan 5 (RPM).
5c	15	0	Fan Tach. 6	Fan	0x04	Threshold	This sensor indicates the speed of the fan 6 (RPM).
5c	16	0	Air Filter	OEM reserved	0xc0	Discrete	This sensor checks the presence of the air filter.
5c	17	0	-48V A Branch 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 5 at the upper fan tray connector.
5c	18	0	-48V A Fused 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 5 after fan tray's main fuse.
5c	19	0	-48V A Branch 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 6 at the upper fan tray connector.
5c	20	0	-48V A Fused 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_A branch 6 after fan tray's main fuse.
5c	21	0	-48V B Branch 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 5 at the upper fan tray connector.
5c	22	0	-48V B Fused 5	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 5 after fan tray's main fuse.
5c	23	0	-48V B Branch 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 6 at the upper fan tray connector.
5c	24	0	-48V B Fused 6	OEM reserved	0xc0	Discrete	This sensor indicates the presence of the –48 V_B branch 6 after fan tray's main fuse.

9.15 Shelf Manager Front Panel and Backplane connectors

Table 15: Front Panel 10/100 Ethernet Service Connector

Pin #	Ethernet Signal
1	TX+
2	TX-
3	RX+
4, 5	n.c.
6	RX-
7, 8	n.c.

Figure 32: Backplane Connectors

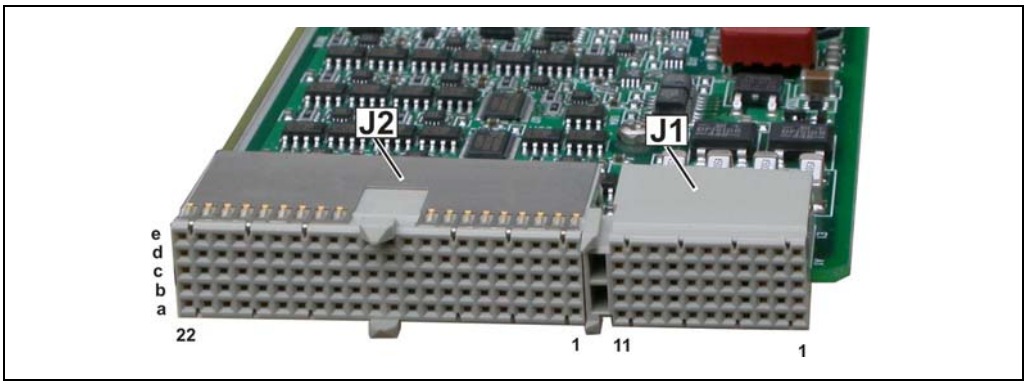

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Table 16: Pin Staging (PS)

Pin#	length
A	**8.25 mm**
B	**9.75 mm**
C	**11.25 mm**

The Pin Staging (PS) is the length of the Pins of the connector at the Backplane not at the Shelf manager.

Table 17: Backplane Signal Connector (J1) pin assignment

	a	PS	b	PS	c	PS	d	PS	e	PS
1	-48 V_A	**B**	VRTN_A	**B**	NC	**B**	-48 V_B	**B**	VRTN_B	**B**
2	-		-		-		-		-	
3	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**	SHELF_GND	**B**
4	-		-		-		-		-	
5	FAN_TACH0	**A**	FAN_TACH1	**A**	FAN_TACH2	**A**	FAN_TACH3	**A**	FAN_TACH4	**A**
6	FAN_TACH5	**A**	FAN_TACH6	**A**	FAN_TACH7	**A**	FAN_TACH8	**A**	PWM_C	**A**
7	FAN_SPEED	**A**	NC	**A**	FAN_24V	**A**	FAN_24V_RTN	**A**	PWM_E	**A**
8	-		-		-		-		-	
9	PEM_PRES_A	**A**	SAP_PRES	**A**	SWR_Input#	**A**	HLY_Input#	**A**	SWR_Output#	**A**
10	TX+	**A**	TX-	**A**	HS_EN	**A**	HLY_Output#	**A**	HA7	**A**
11	AIR_FILT_PR	**A**	PEM_PRES_B	**A**	RX+	**A**	RX-	**A**	PRES_1#	**A**

Table 18: Backplane Signal Connector (J2) pin assignment (Radial IPMB)

	a	PS	b	PS	c	PS	d	PS	e	PS	f	PS
1	FAN_PRES0	A	TXD0	A	TXD1	A	FAN_PRES2	A	INT#	A	GND	C
2	FAN_PRES1	A	DTR	A	Pres_GND	A	CI	A	DSR	A		C
3	CD	A	RTS	A	RXD1	A	HA[0]	A	CTS	A	GND	C
4	RXD0	A	SDA_CH1	A	INV_ACTIVE	A	SDA_CH0	A	GND	A		C
5	SCL_CH1	A	SCL_CH0	A	RI	A	GND	A	SDA_CH3	A	GND	C
6	S1_TX+	A	S1_TX-	A	GND	B	S2_TX+	A	S2_TX-	A		C
7	S1_RX+	A	S1_RX-	A	GND	B	S2_RX+	A	S2_RX-	A	GND	C
8	SDA_CH4	A	SCL_CH4	A	SCL_CH3	A	SCL_CH2	A	I2C_PWR_B	A		C
9	IPMB_SCL_B15	A	IPMB_SDA_B15	A	IPMB_SCL_A15	A	IPMB_SDA_A15	A	SDA_CH2	A	GND	C
10	IPMB_SDA_B16	A	IPMB_SCL_B16	A	IPMB_SDA_A16	A	IPMB_SCL_A16	A	I2C_PWR_A	A		
11	IPMB_SDA_A3	A	IPMB_SDA_B3	A	IPMB_SCL_B3	A	IPMB_SDA_B8	A	IPMB_SCL_B8	A	GND	
12	IPMB_SCL_A3	A	IPMB_SDA_A5	A	IPMB_SCL_A5	A	IPMB_SDA_A8	A	IPMB_SCL_A8	A		
13	IPMB_SDA_A1	A	IPMB_SDA_B7	A	IPMB_SCL_A1	A	IPMB_SDA_A10	A	IPMB_SCL_A10	A	GND	
14	IPMB_SCL_B7	A	IPMB_SDA_A7	A	IPMB_SCL_A7	A	IPMB_SDA_A6	A	IPMB_SCL_A6	A		C
15	IPMB_SDA_A9	A	IPMB_SDA_B14	A	IPMB_SCL_B14	A	IPMB_SDA_B10	A	IPMB_SCL_B10	A	GND	C
16	IPMB_SCL_A9	A	IPMB_SDA_A4	A	IPMB_SCL_A4	A	IPMB_SDA_B6	A	IPMB_SCL_B6	A		C
17	CROSS_SDA_B	A	IPMB_SDA_B11	A	IPMB_SCL_B11	A	IPMB_SDA_B4	A	IPMB_SCL_B4	A	GND	C
18	CROSS_SCL_B	A	IPMB_SDA_A11	A	IPMB_SCL_A11	A	IPMB_SDA_A14	A	IPMB_SCL_A14	A		C
19	IPMB_SDA_A13	A	IPMB_SCL_A13	A	IPMB_SCL_B12	A	IPMB_SDA_B12	A	IPMB_SDA_B9	A	GND	C
20	IPMB_SDA_B1	A	IPMB_SCL_B1	A	CROSS_SCL_A	A	CROSS_SDA_A	A	IPMB_SCL_B9	A		C
21	IPMB_SDA_B13	A	IPMB_SDA_B5	A	IPMB_SCL_B5	A	IPMB_SDA_B2	A	IPMB_SCL_B2	A	GND	C
22	IPMB_SCL_B13	A	IPMB_SDA_A12	A	IPMB_SCL_A12	A	IPMB_SDA_A2	A	IPMB_SCL_A2	A		C

Table 19: Backplane Signal Connector (J2) pin assignment (Bused IPMB)

	a	PS	b	PS	c	PS	d	PS	e	PS	f	PS
1	FAN_PRES0	A	TXD0	A	TXD1	A	FAN_PRES2	A	INT#	A	GND	C
2	FAN_PRES1	A	DTR	A	Pres_GND	A	CI	A	DSR	A		C
3	CD	A	RTS	A	RXD1	A	HA[0]	A	CTS	A	GND	C
4	RXD0	A	SDA_CH1	A	INV_ACTIVE	A	SDA_CH0	A	GND	A		C
5	SCL_CH1	A	SCL_CH0	A	RI	A	GND	A	SDA_CH3	A	GND	C
6	S1_TX+	A	S1_TX-	A	GND	B	S2_TX+	A	S2_TX-	A		C
7	S1_RX+	A	S1_RX-	A	GND	B	S2_RX+	A	S2_RX-	A	GND	C
8	SDA_CH4	A	SCL_CH4	A	SCL_CH3	A	SCL_CH2	A	I2C_PWR_B	A		C
9		A		A		A		A	SDA_CH2	A	GND	C
10		A		A		A		A	I2C_PWR_A	A		
11		A		A		A		A		A	GND	
12		A		A		A		A		A		
13		A		A		A		A		A	GND	
14		A		A		A		A		A		C
15		A	IPMB_SDA_B	A	IPMB_SCL_B	A		A		A	GND	C
16		A		A		A		A		A		C
17	CROSS_SDA_B	A		A		A		A		A	GND	C
18	CROSS_SCL_B	A		A		A	IPMB_SDA_A	A	IPMB_SCL_A	A		C
19		A		A		A	I	A		A	GND	C
20		A		A	CROSS_SCL_A	A	CROSS_SDA_A	A		A		C
21		A		A		A		A		A	GND	C
22		A		A		A		A		A		C

Table 20: Backplane connector (J1) and (J2) pin description

-48V_A	-48 VDC supply A
-48V_B	-48 VDC supply B
AIR_FILT_PR	Air filter presence (grounded by air filter presence switch to detect a missing air filter)
CD	Serial Interface 1 Carrier Detect
CI	Chassis Intrusion signal of ADM1026
CROSS_SCL_A	Serial Clock of IPMB-A, cross-connected on Backplane to serial clock of IPMB-B of other Shelf Manager
CROSS_SCL_B	Serial Clock of IPMB-B, cross-connected on Backplane to serial clock of IPMB-A of other Shelf Manager
CROSS_SDA_A	Serial Data of IPMB-A, cross-connected on Backplane to serial data of IPMB-B of other Shelf Manager
CROSS_SDA_B	Serial Data of IPMB-B, cross-connected on Backplane to serial data of IPMB-A of other Shelf Manager
CTS	Serial Interface 1 Clear To Send
DSR	Serial Interface 1 Data Set Ready
DTR	Serial Interface 1 Data Terminal Ready
FAN_24V	Auxiliary 24 VDC (max. 100 mA) generated on Fan Trays (Voltage supply for opto-couplers on Shelf Manager)
FAN_24V_RTN	Return path (Ground reference) for the auxiliary 24 VDC, generated on Fan Trays, used also as reference ground for the fan control voltage
FAN_PRES[0...2]	Fan Tray present (grounded on Fan Tray when present)
FAN_SPEED	DC for Fan Speed Control (0 V to 10 V, 10 mA)
FAN_TACH[0...8]	Tachometer signals from Fan Trays
GND	logic ground
HA[0]	Hardware address of Shelf Manager - grounded: Shelf Manager IPMI address is 0x10 - open: Shelf Manager IPMI address is 0x12
HA7	Hardware address of Shelf Manager - grounded: Shelf Manager IPMI address is 0x10 - open: Shelf Manager IPMI address is 0x12
HLY_Input#	Health input Shelf Manager (proprietary signal cross-connected on Backplane to HLY_Output of other Shelf Manager)
HLY_Output#	Health output Shelf Manager (proprietary signal cross-connected on Back-plane to HLY_Input of other Shelf Manager)
HS_EN	Tells the Shelf Manager that it is plugged in (Grounded on Backplane)
I2C_PWR_A	3.6 V (max. 500 mA) generated on Shelf Manager, redundant path A for Shelf I^2C-devices on Fan Trays, PEMs and SAP
I2C_PWR_B	3.6 V (max. 500 mA) generated on Shelf Manager, redundant path B for Shelf I^2C-devices on Fan Trays, PEMs and SAP
INT#	External Interrupt request (Master Only I^2C-bus)
INV_ACTIVE	This ShMM is in active mode (inverted signal of ShMM)
IPMB_SCL_A_[1...16]	Serial Clock, IPMB-A
IPMB_SCL_B_[1...16]	Serial Clock, IPMB-B
IPMB_SDA_A_[1...16]	Serial Data, IPMB-A
IPMB_SDA_B_[1...16]	Serial Data, IPMB-B

NC	not connected
PEM_PRES_[A, B]	PEM [A, B] presence signal (grounded on PEM when present)
PRES_1#	Shelf Manager board presence signal (proprietary signal cross-connected on Backplane to PRES_GND of other Shelf Manager)
PRES_GND#	Shelf Manager presence ground (proprietary signal cross-connected on Backplane to PRES_1# of other Shelf Manager)
PWM_C	Opto isolated PWM signal for fan speed control, collector U_{CE0} = max. 70 V, I_{max} = 2 mA
PWM_E	Opto isolated PWM signal for fan speed control, emitter, connected to FAN_24V_RTN on Backplane
RI	Serial Interface 1 Ring Indication
RTS	Serial Interface 1 Request To Send
RX(+-)	Ethernet interface (ETH1) to Hub-Slot (ShMC cross connect)
RXD0	Serial Interface 1 Receive Data
RXD1	Serial Interface 2 Receive Data (not used in Schroff Shelves)
S1_RX(+-)	Ethernet interface (ETH0)
S1_TX(+-)	Ethernet interface (ETH0)
S2_RX(+-)	USB interface, cross-connected on Backplane to S2_TX(+-) of other Shelf Manager
S2_TX(+-)	USB interface, cross-connected on Backplane to S2_RX(+-) of other Shelf Manager
SAP_PRES	Presence signal of SAP (Grounded on SAP when present)
SCL_CH0	Master Only-I^2C-bus Channel 0 to SAP
SCL_CH1	Master-Only I^2C-bus Channel 1
SCL_CH2	Master-Only I^2C-bus Channel 2
SCL_CH3	Master-Only I^2C-bus Channel 3
SCL_CH4	Master-Only I^2C-bus Channel 4
SDA_CH0	Master Only-I^2C-bus Channel 0 to SAP
SDA_CH1	Master-Only I^2C-bus Channel 1
SDA_CH2	Master-Only I^2C-bus Channel 2
SDA_CH3	Master-Only I^2C-bus Channel 3
SDA_CH4	Master-Only I^2C-bus Channel 4
SHELF_GND	Shelf Ground
SWR_Input#	Switchover signal from the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Output of other Shelf Manager)
SWR_Output#	Switchover signal to the other Shelf Manager (proprietary signal cross-connected on Backplane to SWR_Input of other Shelf Manager)
TX(+-)	Ethernet interface (ETH1)
TXD0	Serial interface 1 Transmit Data
TXD1	Serial interface 2 Transmit Data (not used in Schroff Shelves)
VRTN_A	Voltage return supply A
VRTN_B	Voltage return supply B

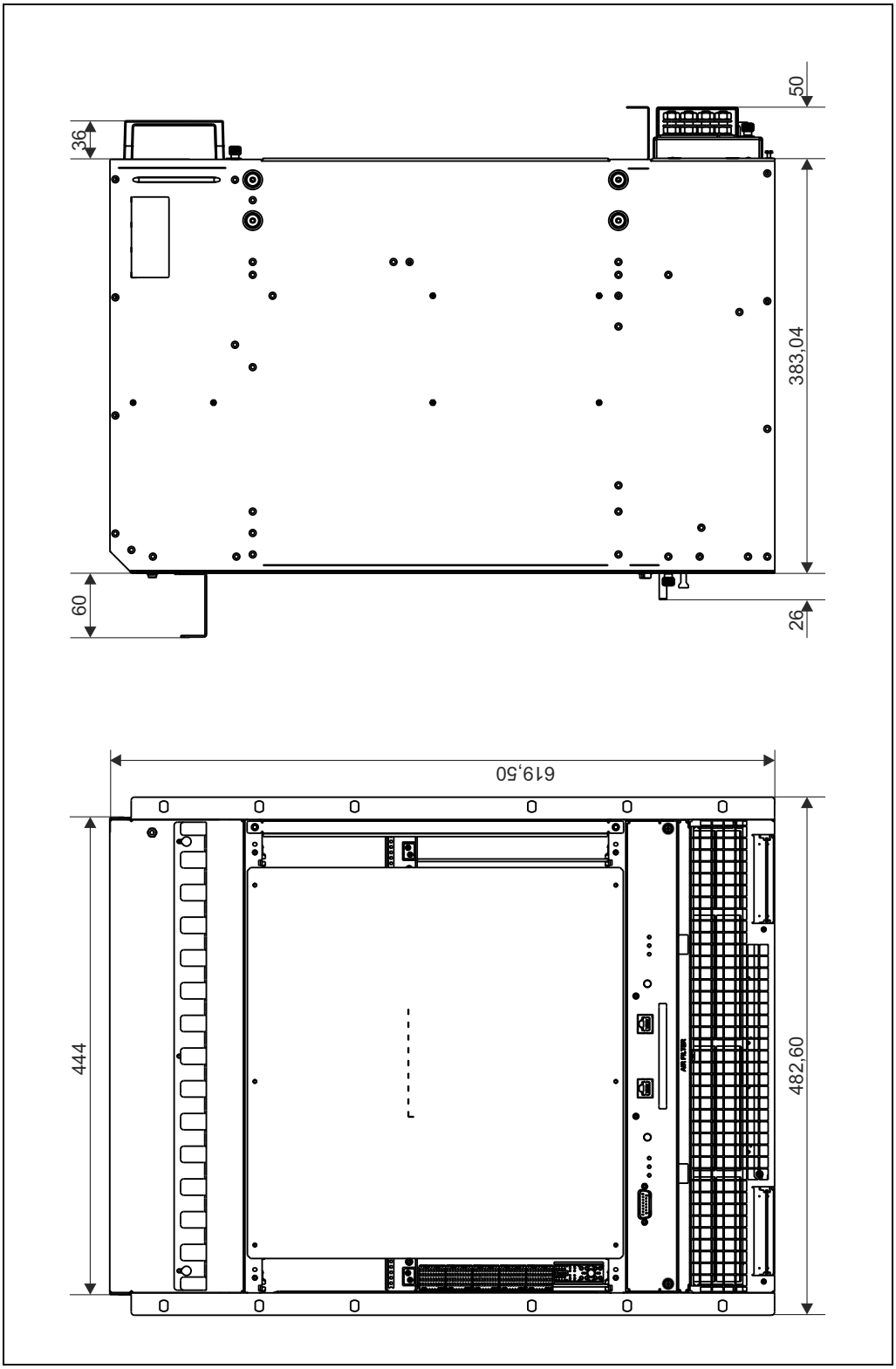
10 Technical Data

Table 21: Technical Data

Physical Dimensions	
See drawing	
Weight	
Shelf weight completely assembled	35 kg
Power	
Input voltage	-40 VDC …. -72 VDC
Input Power	210 A per power feed (Each power feed is divided internally at the PEM in 6 output branches with 35 A each)
Overcurrent Protection	50 A fuses on PEM
Environmental	
Ambient temperature (long term)	+5°C…+40°C (41°F to 104°F)
Ambient temperature (short term)	-5°C…+55°C (23°F to 131°F)
Humidity	+5%...+85%, no condensation
EMI	
Conducted Emissions	EN 55022 Class A
Radiated Emissions	EN 55022 Class A
Safety	
Protected Earth Test	EN50514, test current 25 A, resistance <100 mOhm
Hipot Test	EN60950-1, 1000 VDC

10.1 Shelf Mechanical Dimensions

Figure 33: Shelf dimensions



All dimensions are in millimeters (mm).

SCHROFF GMBH

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